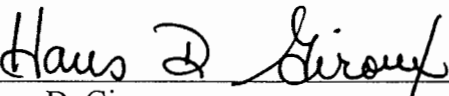




**NOISE IMPACT ANALYSIS**  
**QUEEN OF ANGELS CHURCH (MUP 83-054W)**  
**ALPINE, CALIFORNIA**

**MUP# P83-054W**

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## NOISE IMPACT SOURCES

Two noise sources are typically identified with a development such as the proposed church expansion. Construction activities, especially heavy equipment, will create short-term noise increases near the project site during construction. Upon completion, vehicular traffic on streets around the development area may create a higher noise exposure to Alpine area residents beyond the noise levels currently experienced. Since traffic-related noise/land use standards are based upon a weighted 24-hour average exposure, and since church traffic occurs mainly during less noise-sensitive hours with low (Sunday) baseline traffic volumes, the project's traffic noise impact on its environment will likely be minimal.

However, because churches are noise sensitive, siting such uses requires careful consideration of their exterior and interior noise exposure. In developed areas, the impact of the ambient noise environment on the project due to roadway proximity, rather than of the project on off-site uses, is sometimes a greater noise impact analysis concern. Because of low traffic volumes on West Victoria Drive, and with the absence of any nearby freeway, airport or noisy heavy industry, ambient noise levels are currently low, and will remain so into the future. Ambient noise is not a constraint to proposed site development.

In addition to the issue of site suitability for proposed noise-sensitive uses, the project will generate noise that may affect off-site uses on A-70 (noise sensitive) uses. Project noise generation will include on-site traffic, the use of church bells, chimes or other signaling/call to worship devices, and the operation of mechanical equipment (air conditioners) at the three new buildings. Whereas site suitability is determined by the ambient noise environment acting upon the site (General Plan standards), on-site noise generation is regulated by the San Diego County Noise Ordinance. The ordinance does, however, take into account the existing non-project noise environment. If background noise is already elevated, on-site noise generation is held to a less stringent standard than within a pristine acoustic environment.

## NOISE STANDARDS

Most community noise problems typically derive from transportation sources under the regulatory control of other agencies (Highway Patrol, FAA, etc.). Vehicular traffic, rail, or aircraft noise control is preempted by other agencies. Local control is affected by land use decisions that define acceptable noise exposure as a function of land use sensitivity. Acceptability is stated in the Noise Element of the San Diego County General Plan.

The Noise Element, by State law, uses a noise parameter called the Community Noise Equivalent Level (CNEL). CNEL is a weighted 24-hour exposure where noise events during the evening, and especially at night, are assigned an artificial penalty during times of greater noise sensitivity. CNEL is calculated by averaging the noise levels from 7:00 a.m. to 7:00 p.m., plus levels from 7:00 p.m. to 10:00 p.m. increased by +5 dB, and levels from 10:00 p.m. to 7:00 a.m. increased by +10 dB. The noise "penalties" for hours of greater noise sensitivity are equivalent to counting each evening noise event (vehicles, etc.) as three events, and each nocturnal noise generator as ten noise-equivalent sources. The State of California has developed model noise exposure levels based on the CNEL descriptor that are proposed for local adoption. These model standards contain multiple categories of acceptability and category overlaps. They also do not address

interior standards required under Titles 24/25 of the California Code of Regulations. San Diego County, in the noise element of the general plan, therefore condensed this matrix of noise exposure goals into a much simpler format.

Policy 4b of the General Plan is designed to protect proposed land uses from adverse noise exposure. Whenever possible, development of noise sensitive areas (NSAs) should not exceed 55 dB(A) CNEL. If noise levels are predicted to exceed 60 dB(A) CNEL, a noise study is required. This study must document the mitigation to be employed to achieve a 60 dB(A) CNEL exterior noise exposure. Attaining an exterior 60 dB(A) CNEL generally allows the interior standard of 45 dB(A) CNEL to be met without substantially enhanced structural mitigation. For NSAs occupied less than 24 hours (schools, libraries, etc.), the interior standard is 50 dB CNEL.

On-site noise generation occurring on one land use that may affect an adjacent use is governed by the San Diego County Code of Regulatory Ordinances (Section 36.401 et seq.). For the proposed activities, there are few activities to which ordinance limits would apply. On-site noise generation that might be regulated by ordinance would include limits on operation of mechanical equipment (HVAC), or on the allowable hours for trash collection, parking lot sweeping or construction activities. Contemplative gardens would be considered a passive park use, and would also be regulated by ordinance. Churches typically do not have noise-related conflicts with adjacent communities amendable to ordinance enforcement. In rare cases, religious observances that involve bells or other call-to-worship devices, or amplified or otherwise loud music, may be a source of conflict with their neighbors. Such conflict is more the exception rather than the rule.

The amount of noise that activities on one land use may create at an adjoining use is regulated by Section 36.404 of the County Ordinance. The proposed project and surrounding uses generally have A-70 zoning. A-70 is provided the highest degree of noise protection. The allowable noise exposure at any A-70/A-70 interface is as follows:

7:00 a.m. to 10:00 p.m.	50 dB(A) LEQ (1-Hour)
10:00 p.m. to 7:00 a.m.	45 dB(A) LEQ (1-Hour)

These standards, however, are modified if the existing ambient environment already exceeds these thresholds. When background noise levels exceed the daytime or nocturnal criteria, those compliance levels are adjusted upward to equal the background level.

## **BASELINE NOISE LEVELS**

Noise measurements were made at three locations on the project perimeter. The purpose of these measurements was to verify the suitability of the site for proposed noise-sensitive land uses, and to determine whether any relaxation of the County Noise Ordinance standard is appropriate based upon existing background noise conditions.

Table 1 summarizes the results of the on-site noise readings made for 48+ hours at three locations as follows:

Site 1 = South property line near sanctuary/devotional garden.

**Table 1**  
**On-Site Noise Measurement Summary**

Time	6/4/02			6/5/02			6/6/02		
	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
00-01	-	-	-	41	43	40	40	43	39
01-02	-	-	-	39	42	39	39	41	38
02-03	-	-	-	39	42	39	36	40	37
03-04	-	-	-	39	42	39	37	41	38
04-05	-	-	-	43	45	43	39	42	41
05-06	-	-	-	48	48	47	42	46	45
06-07	-	-	-	48	50	48	47	46	43
07-08	-	-	-	42	46	43	44	45	43
08-09	-	-	-	38	43	41	41	44	39
09-10	-	-	-	38	43	40	37	42	40
10-11	-	-	-	37	42	40	40	45	40
11-12	-	-	-	40	45	40	42	47	43
12-13	-	-	-	39	45	44	37	43	38
13-14	-	-	-	50	54	52	37	44	37
14-15	-	-	-	47	51	48	40	45	42
15-16	-	-	-	48	53	50	47	52	48
16-17	-	-	-	43	49	46	48	50	45
17-18	48	51	48	41	47	46	46	51	46
18-19	53	58	53	49	54	50	46	48	45
19-20	53	55	53	47	51	48	46	50	48
20-21	42	45	40	44	46	42	45	46	44
21-22	46	46	43	45	47	44	47	47	44
22-23	50	51	48	45	48	45	46	46	44
23-24	42	44	40	54	58	54	-	-	-
24-Hr. CNEL				53	56	54	50	52	49

Site 2 = South property line near new administrative and new fellowship hall.

Site 3 = North property line near existing Hale Drive residence.

The San Diego County siting standard for noise-sensitive land uses is 60 dBA CNEL. The measured CNEL ranged from 49-56 dBA. The June 5 readings were measurably higher than on June 6, 2002. This was due to several loud hours that were likely not part of the "normal" noise environment. The existing background CNEL appears to be closer to 50 dBA at each of the identified noise-sensitive, on-site uses.

One-hour noise levels as low as 37 dBA LEQ were observed during these measurements. The County daytime noise ordinance standard is 50 dBA LEQ. Some background noise levels did exceed the County limit, but the compliance standard would be relaxed if the majority of background hours exceeded the applicable standard. Since the noise at the project perimeter is predominantly quiet, the allowable A-70 property line noise standard of 50 dBA LEQ (daytime) would apply. Since there are few on-site activities from 10:00 p.m. to 7:00 a.m., the nocturnal standard was only secondarily considered.

## **NOISE IMPACTS**

There are two potential noise issues associated with the proposed project. If the proposed expansion were to create noise levels that exceed the allowable San Diego County Noise Ordinance thresholds on any adjacent A-70 zoning, then mitigation would need to be applied to the noise sources to reduce them to within allowable levels. Similarly, if noise-sensitive uses were to be proposed on-site that would be exposed to ambient noise levels exceeding General Plan standards for noise-sensitive areas (NSAs), mitigation would similarly be required before the project could be approved.

## **ON-SITE NOISE EXPOSURE**

On-site noise measurements had demonstrated that existing noise levels were very low. The project site is distant from any major roadway noise sources. Traffic levels on adjacent Victoria Drive are very low (currently 1,000 ADT). There are no airports in the Alpine area generating any substantial air traffic.

Noise-sensitive exterior areas of the project site have existing noise levels near 50 dBA CNEL. It would require a ten-fold increase in traffic volumes to increase ambient noise to the 60 dBA County Policy 4b standard. There are no ten-fold traffic volume increases predicted in the project vicinity.

Noise-sensitive areas for the project site include a gathering plaza, social patio and devotional garden. These uses are 400 feet or more from West Victoria Drive, and will be additionally partially screened by the social hall ("New Hall" building structure. Ambient noise exposure at any NSAs will therefore remain well below the acceptable maximum of 60 dBA CNEL. Any potential noise issues would center exclusively on project noise impacts at any adjacent property line rather than from any acoustic environment impact upon proposed on-site uses.

The project description identifies childcare as an on-site function. There are no proposed childcare services except for an indoor toddler and infant play area in the parish hall to be used during services by children too young to participate in the mass. This activity involves no outdoor play. Indoor “babysitting” services during mass are not noise generators in that no exterior play will occur. They are similarly not considered a noise sensitive interior use since no instructional or sleeping and napping activities are part of this activity.

The site may use electric bells or chimes for call-to-worship purposes between 9:00 a.m. to sunset. Under the existing major use permit, these sounds are not required to comply with the County Noise Ordinance. However, because the noise ordinance limit is an hourly average, while bells or chimes are typically only briefly sounded, they would not be expected to exceed standards even though they are specifically exempt.

On-site noise exposure was further evaluated using the SOUND32 Computer Model to estimate peak hour noise levels. The model was initially run for no terrain and no structural interference with acoustically “hard” conditions. If the worst-case input assumptions produced no adverse noise exposure, incorporation of more complex terrain and various structures would simply create a greater level of safety. Build-out traffic of 3,700 ADT on West Victoria Drive (370 ADT peak hour) was used to model future traffic noise levels. The one-hour LEQ calculation used the following input parameters:

Auto 362° Speed = 50mph

Medium Truck 4°

Heavy Truck 4°

° = mix of 98%/1%/1% (Alpine Christian Fellowship Study)

The resulting noise levels were as follows if the 24-hour CNEL is presumed to be (LEQ + 2 dB):

Land Use	LEQ(1)	CNEL
New Admin Bldg.	57	59
New Hall	56	58
New Church	53	55
Gathering Plaza	54	56
Soc. Patio/Dev. Garden	53	55
Off-Site Residence	58	60

Source: SOUND32 Model, Input/Output in Appendix.

The front of the adjacent home will have a future noise exposure that equals the San Diego County standard. All other noise exposures will be within siting standards for even the most over-predictive input assumptions.

## **PROJECT NOISE GENERATION**

Project-related noise may be due to the traffic it generates within the site itself, from on-site activities (public assembly, call-to-worship, outdoor music, etc.), or from mechanical equipment (heating, a/c, etc.). While churches are generally considered an NSA, they may also be noise generators. The project may also generate temporary noise during construction.

## TRAFFIC NOISE

Project-related traffic may create perceptible noise increases along project area roadways, and at off-site residences near the project site. Off-site (on-street) impacts are governed by the County General Plan Policy using the 24-hour weighted CNEL metric. On-site traffic noise generation from parking or from drop-off traffic is regulated by the noise ordinance.

On-street traffic noise from site traffic will be superimposed upon the baseline (no-project) traffic. The noise increment attributable to the project is calculated as follows:

$$\text{Noise} = 10 \times (\log [(BASE + PROJ)/BASE])$$

Where BASE is the baseline ADT of 3,700

PROJ is the project ADT of 590 max, 145 avg.

The noise increments for average daily and peak attendance are as follows:

$$\text{NOISE (MAX)} = 10 \times (\log [3845/3700]) = +0.2 \text{ dB}$$

$$\text{NOISE (AVG)} = 10 \times (\log [4290/3700]) = +0.6 \text{ dB}$$

Changes of less than +1.5 dB are generally undetectable even under laboratory conditions. Off-site traffic noise impacts are less-than-significant.

The distance from the nearest off-site residence to the project driveways is around 215 feet from the West Victoria entry. The hourly noise increment will depend upon the number of vehicles on these drives under an assumed direct line of sight relationship. At 15 mph, the vehicle noise per various cars per-hour on the driveway is approximately as follows at 215 feet (dB(A) LEQ)<sup>1</sup>:

	1 Car/hr	100 cars/hr	200 Cars/hr
50 feet	26.1	46.1	49.1
215 feet	19.8	39.8	42.8

The County noise standard is 50 dB(A) LEQ by day, and 45 dB(A) LEQ after 10:00 p.m. Daytime traffic will be 200 cars per hour or less using the West Victoria Drive access. The daytime noise standard will be met by. Even if an evening event occurred after 10:00 p.m. involving hundreds of arriving or departing attendees, the 45 dB nocturnal standard would not be threatened by several hundred users of accessing or departing via the site entrance. Site access/egress traffic noise is not considered a noise impact issue.

Post-10:00 p.m. departures would also generate on-site noise within the parking lot from alarm "chips," door slams, and engine startups. The off-site noise level from such activities is not

<sup>1</sup> LEVEL (1 Car) =  $10 \times \log (15^{**}4.174 \times 10^{**}0.115 + 10^{**}5.013) - 27.1$

Source: Caltrans TENS, P. N-132 (1998).

easily established because one car may shield an adjacent car, physical interference from buildings and grade separation may modify line-of-sight assumptions, and parking behavior itself will affect noise levels. A small attendance even would have vehicles parked near the door of the venue. A major event would have cars distributed throughout the lot.

Noise measurements from cars leaving a parking lot were recently (July 2002) reported by Mestre-Greve Associates in a parking structure noise study (MGA Report #02-139.A). The measured maximum noise level at 50 feet from a vehicle was 60-70 dB for door slams, and 60-70 dB for startups under direct line-of sight (isolated vehicle) conditions. Vehicle idle noise was around 55 dB. The measurement includes multiple echoes from a concrete structure. For a parking lot with intervening cars and without echo effects, the lower end of each measurement range was assumed most representative of the project site.

A noise reference level for parking lot departures was calculated by assuming a 1-second pulse for door slams, a 3-second starter cranking period, and 10 seconds of vehicle idle to drive-off. The reference vehicle noise per individual vehicle is calculated as follows:

$$= 10 \times \log [(1 \times 10^{6.0} + 3 \times 10^{6.0} + 10 \times 10^{5.5})/3600]$$

$$= 33 \text{ dBA Leq per vehicle}$$

The reference noise level will increase with numbers of vehicles in the lot, and decrease with distance beyond 50 feet from the "centroid" of parked cars. The average distance from the center of the parking field to the nearest homes is 250 feet. The off-site noise exposure as a function of post-10:00 p.m. departures is calculated as follows:

No. of Departures/hour	Leq at 250 feet (dBA)
10	29
20	32
50	36
100	39
200	42
228	43

The nocturnal standard of 45 dBA Leq will not be exceeded at the nearest residence due to parking lot activities even if every parking space is filled and vacated within 1 hour.

Combined noise levels from the entire parking lots (228 cars) emptying during 1 hour after 10:00 p.m. could slightly exceed the County noise standard as follows:

$$\text{Combined} = 10 \times \log (10^{4.34} [\text{driveway}] + 10^{4.26} [\text{in-lot}])$$

$$= 46 \text{ dBA Leq}$$

If any vehicles left before 10:00 p.m., or any vehicles remained after the completion of the event for cleanup or other activities, the maximum activity level would be slightly reduced. The maximum plausible lot "turnover" rate in any hour after 10:00 p.m. is 200 vehicles. The combined noise from 200 stationary departure preparation and subsequently moving vehicles is 45 dBA Leq at the nearest residence. This does not exceed the County noise ordinance standard.

A church parking lot noise study was conducted for the Skyline Wesleyan project in the Rancho San Diego area of San Diego County. This study used a "flat lot" noise measurement of a 312-car church lot departure, including start-up and drive-off noise. The reported noise level (Skyline Wesleyan Church Noise Study, 1995) was 49 dBA Leq at 200 feet from the center of the parking activity. If these data are adjusted for 200 cars per hour at 250 feet from the center of the lot, the predicted noise level is as follows:

Measured (312 cars, 200 feet)	49.0 dBA
200 vs. 312 cars	1.9 dBA
250 vs. 200 feet	1.9 dBA
Residual	45.2 dBA Leq

The adjusted measurements and the calculated value based on door slams and startups produce an almost exact match in predicted off-site noise levels. Post-10:00 p.m. departure from a major service or other church function will not cause the nocturnal County noise standard to be exceeded near any off-site residences.

## ON-SITE EQUIPMENT NOISE

On-site noise will derive mainly from mechanical (heating, ventilation, air/conditioning, or HVAC) equipment was obtained from manufacturer's specifications. Because of a variety of suppliers, the sound ratings are stated as both sound power levels, as well as sound pressure levels (in "bels" or "decibels"). Air conditioning unit sound data was presumed to be reported consistent with Air Conditioning and Refrigeration Institute (ARI) standards for the given type of unit. Exhaust fan noise expressed in terms of sound power level was assumed functionally equivalent to standard ARI sound rating protocols.

A matrix of outdoor equipment was developed for each of three source locations, and the equipment was assigned to the roof or a ground level source location. The roof-mounted equipment will be shielded from the nearest property line by the roof parapet. On-site structures particularly the sanctuary, will shield some off-site residences from a direct line-of-sight to a portion of the equipment. The outdoor equipment that may create a perceptible noise level at the property line includes:

### SANCTUARY BUILDING

Equipment	No.	Location	ARI Rating
38QRC024	1	Ground	68
38HO34	2	Roof	95 ea.
50HJQ005	1	Roof	76
50HJQ006	1	Roof	80

### ADMIN. BUILDING

Equipment	No.	Location	ARI Rating
38QRC024	2	Ground	68 ea.
38QRC036	1	Ground	68
38QRC048	2	Ground	76 ea.

### HALL BUILDING

Equipment	No.	Location	ARI Rating
50HS024	1	Roof	80
50HJQ004	1	Roof	76
50HJQ005	5	Roof	76 ea.
50HJQ008	1	Roof	82
RPB Hood Fan	1	Roof	76
VCR245-HP	1	Roof	84

Source: Manufacturer noise specifications in appendix.

Off-site noise levels due to mechanical equipment operations were calculated at the patios of the nearest residences to various project HVAC noise sources. Calculations were also performed at the closest residential property lines, at locations with the clearest lines-of-sight to on-site sources.

Six unique sources were identified as possibly impacting residences to the north, east, south and southeast of the project site. The source strength for every unit running at full power is as follows:

**Noise Source Strength Assignment (combined sound rating in decibels)**

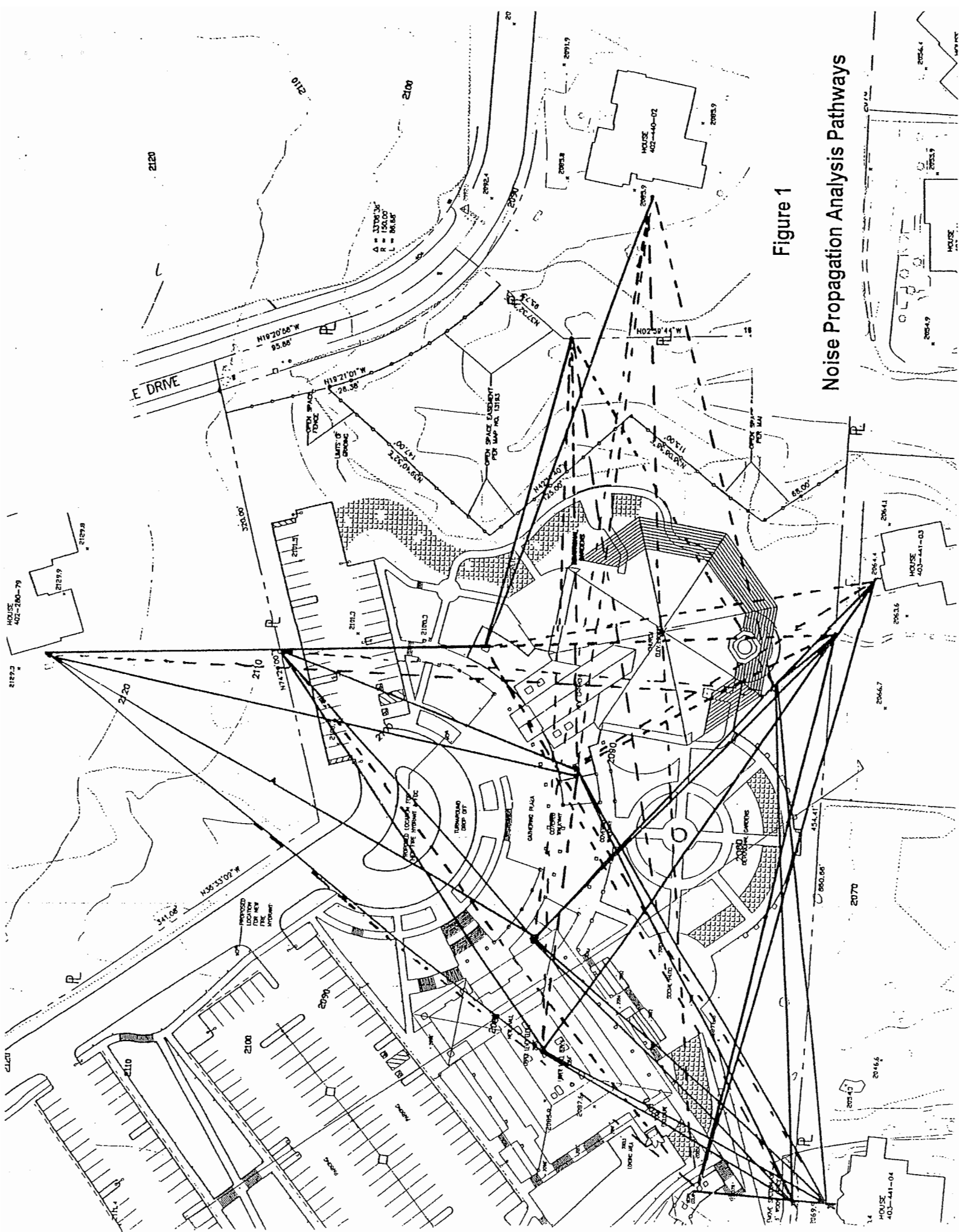
No.	Location	Source Strengths	Total
1	Sanctuary Roof East	80, 95	95
2	Sanctuary Roof West	76, 95	95
3	Sanctuary Ground	68	68
4	Hall Roof Well	6x76, 80, 82, 84	89
5	Hall Subroof	76	76
6	Admin. Ground	3x68, 2x76	80

Four receiver locations were evaluated at the nearest outdoor area facing the church property ("patio"), and at the common property line with the project site.

Those receivers paths with a direct line-of-sight to the source, or with only one intervening parapet or equipment well barrier, were evaluated in terms of any extra structural attenuation created by the interruption in the line-of-sight. For multiple barriers, or with an entire building shielding the line-of-sight, an average structural attenuation of 15 dB was assumed because straight-line propagation models do not readily incorporate multiple-barrier configurations. Figure 1 shows the propagation paths analyzed. Solid lines were explicitly analyzed in terms of direct views of source-receiver path length differences. Dotted lines were estimated because they were fully shielded by buildings or had multiple intervening barriers.

Noise propagation was assumed to be via spherical spreading, and any "extra" attenuation due to barrier effects was calculated using the direct and indirect path length difference for an assumed 550 Hz-centered mechanical equipment noise.

As a worst-case initial approximation, every piece of equipment was operating at 100 percent maximum power for an hour. The resulting worst-case property line and patio noise exposures are shown in Table 2.



**Figure 1**

## Noise Propagation Analysis Pathways

**Table 2**  
**Off-Site Mechanical Equipment Noise**

	Source Contribution (dBA)*						
	1	2	3	4	5	6	Total
<b>South House</b>							
Patio	34	33	11	23	16	29	37
Property Line	36	34	12	24	17	30	39
<b>Southwest House</b>							
Patio	35	29	9	27	17	43	44
Property Line	36	29	10	28	18	45	46
<b>East House</b>							
Patio	36	30	4	22	9	13	37
Property Line	38	33	6	22	11	13	39
<b>North House</b>							
Patio	40	38	1	29	19	13	42
Property Line	46	42	5	30	19	14	48

\*Source 1 = East Sanctuary Wing  
Source 2 = West Sanctuary Wing  
Source 3 = Sanctuary Ground

Source 4 = Hall Roof Well  
Source 5 = Hall Subroof  
Source 6 = Admin. Bldg.

No receivers would exceed the daytime noise ordinance standard even if every HVAC unit operated continuously for 1 hour. The nocturnal standard could be exceeded at the northern property line if the sanctuary air conditioning units ran for a solid hour from 10:00 p.m. to 7:00 p.m. The nocturnal standard could be exceeded at the southwest property line if all Administration Building HVAC units ran for one hour between 10:00 p.m. and 7:00 a.m. A total of 3 dB of nocturnal attenuation would need to be created to maintain equipment noise within County limits for special nocturnal sanctuary events. A 1 dB attenuation would be needed for the Administration Building units if they all ran at night for a solid hour.

The recommended mitigation is as follows:

## **SANCTUARY BUILDING**

Erect a screen wall that interrupts the line-of-sight between the 38 H034 units on the sanctuary roof and the northern property line that achieves an additional 3 dB of attenuation for northward noise propagation from these units.

The screen wall was assumed to be located within 3 feet of the HVAC unit, and the top of the wall was assumed to be 1 foot taller than the roof parapet (top of screen wall = 2,105 feet mean sea level (msl)). By placing the wall closer to the units and slightly higher than the parapet as shown in Figure 2, the “noise shadow” is substantially deepened. The modified calculation for the northern property line, assuming use of a screening wall with a transmission loss of 27 dB or higher (20-gauge sheet metal, 1/8-inch fiberglass reinforced plastic, 1/4-inch glass or acrylic sheet, or similarly weighted/stiffness material), is as follows:

Source Height = 2,101 feet  
 Barrier Height = 2,105 feet  
 Receiver Height = 2,114 feet  
 Distance to Barrier = 5 feet  
 Distance to P.L.:

East unit = 140 feet  
 West unit = 210 feet

<b>Parameter</b>	<b>East Unit</b>	<b>West Unit</b>
Direct Path	140.60 feet	210.40 feet
Indirect Path to Barrier to Receiver	6.40 feet 135.30 feet	6.40 feet 205.20 feet
Fresnel No.	1.08	1.17
Noise Reduction	13 dB	14 dB

The property line noise with full operation of all sanctuary HVAC units after 10:00 p.m. is as follows:

Source	Contribution (dBA)
East Sanctuary Wing	41
West Sanctuary Wing	37
Sanctuary Ground	5
Hall Roof Well	30*
Hall Subroof	19*
Admin. Bldg.	14*
<b>TOTAL</b>	<b>43 dBA Leq</b>

\*Not likely running from 10:00 p.m. to 7:00 a.m.

Hourly operation of all sanctuary HVAC units will not cause noise levels to exceed County nocturnal noise standards at the nearest property line if the screen wall is installed as shown in Figure 2.

## ADMINISTRATION BUILDING

The potential "excess" 1 dB at the southwest property line is due almost exclusively to the ground floor units at the Administration Building. The contribution from the various HVAC sources at this location is as follows:

Ground Floor Administration Bldg.	45 dBA Leq
All other sources	37 dBA Leq
Total	46 dBA Leq

Any measurable noise reduction from the Administration Building units would meet County post-10:00 p.m. standards with a large margin of safety since the degree of excess is small and derives from one unique set of sources. Any break in the line-of-sight between the mechanical equipment and the receiver will create a minimum of 5 dB of reduction. The receiver height is 2,082 feet. A masonry wall that breaks the line-of-sight from the source to the receiver with a top of wall elevation of 2,082 feet would produce more than adequate noise attenuation. The wall location needed to meet the noise standard is shown in Figure 3. A 4-foot upward extension of the retaining wall will allow 24-hour per day operation of all on-site HVAC units without violation of any San Diego noise standards.

Figure 2

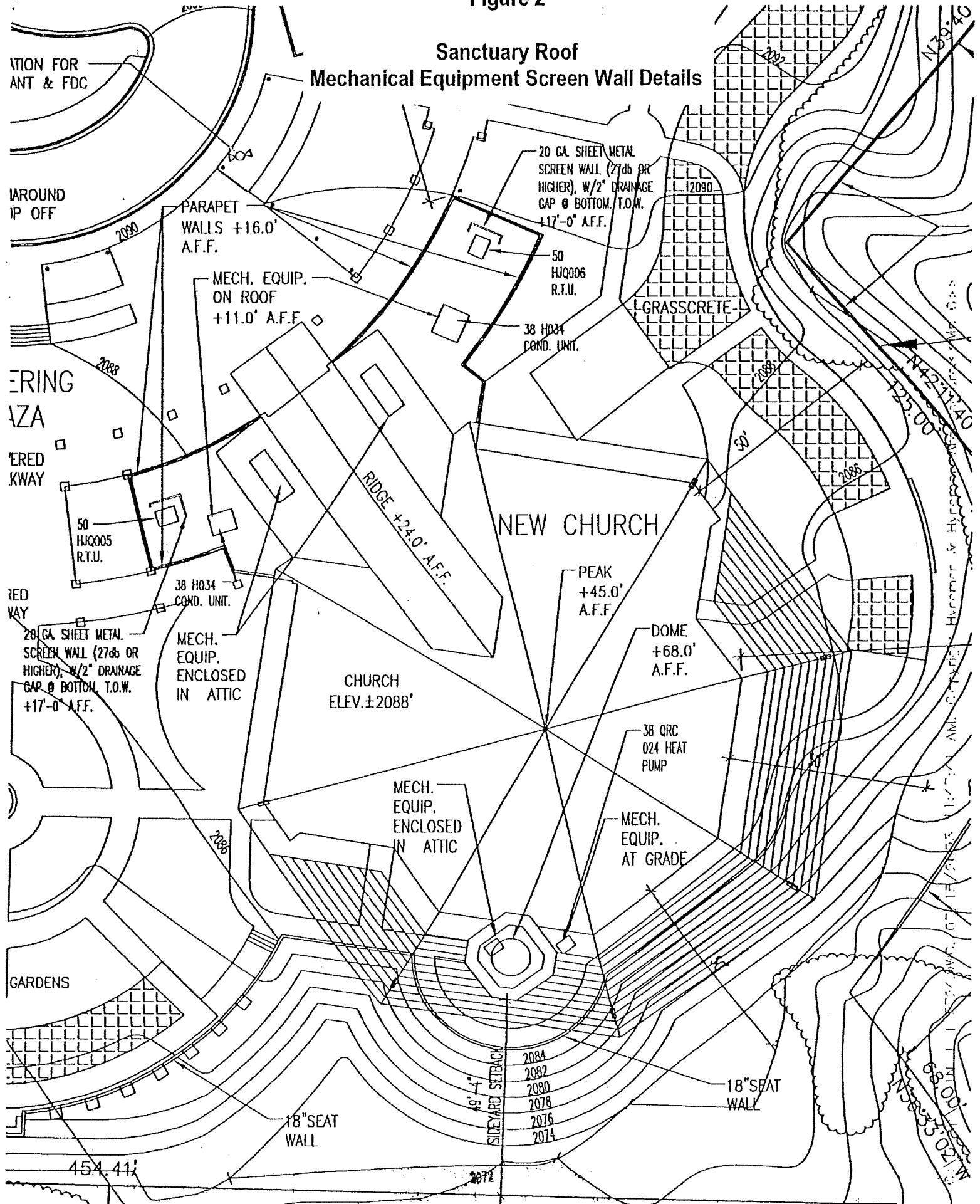
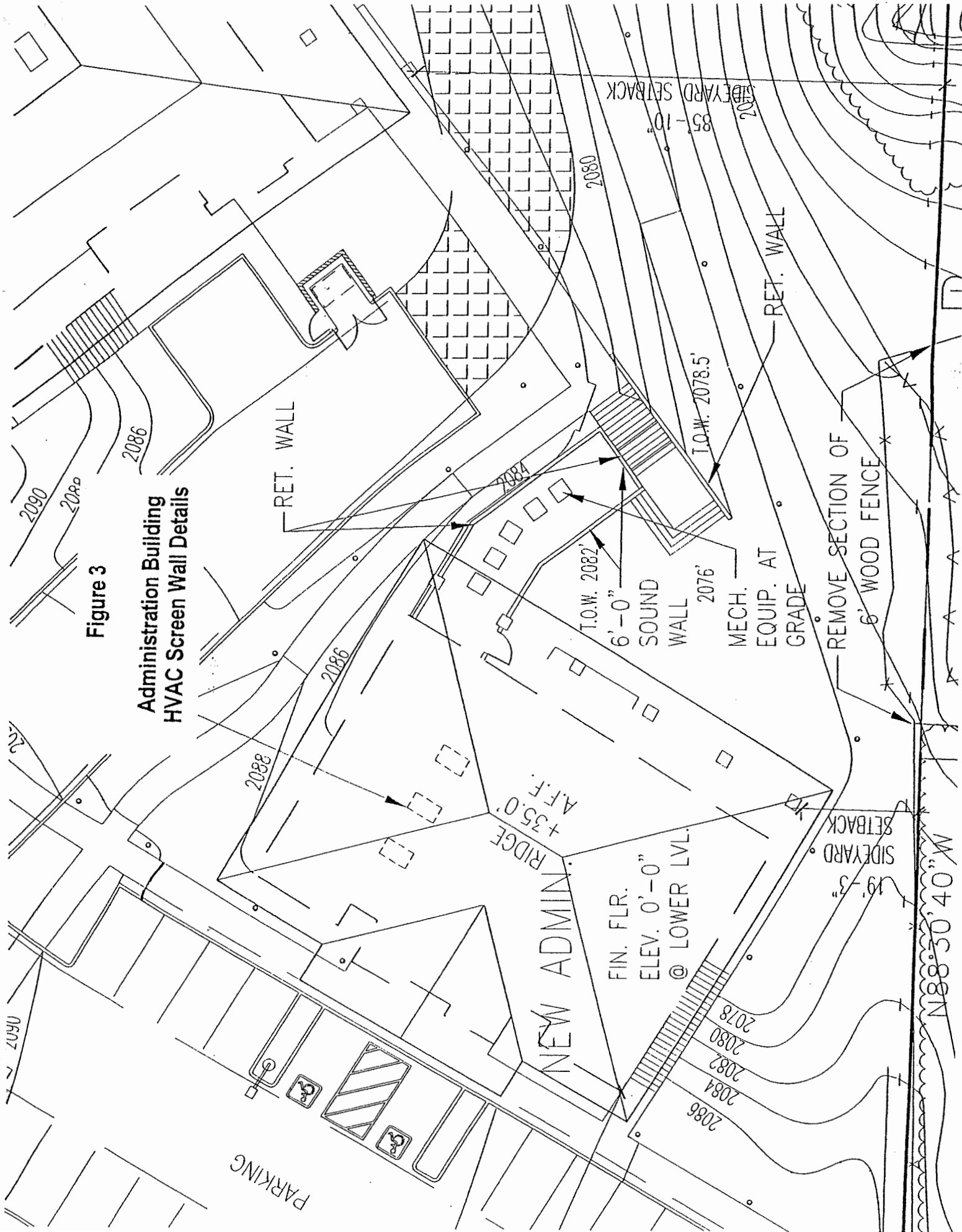


Figure 3

Administration Building  
HVAC Screen Wall Details



## INTERIM PROJECT CONFIGURATION

The proposed project includes a possible interim development using modular buildings while the membership grows and permanent facilities are constructed. Noise generation and resulting off-site exposure from the interim use (traffic, etc.) will generally be less than from the build-out facility.

The interim campus will, however, have an array of wall-mounted air conditioners at the end of each modular building. A total of 14 modular buildings and associated HVAC systems may be deployed for the interim site plan. The interim layout could have both the hall and administration buildings as interim structures, or one or the other. The possible permutations of permanent and interim structures is as follows:

Structure	Scenario		
	A	B	C
Sanctuary	P	P	P
Fellowship Hall	I	P	I
Administration Bldg.	I	I	P

P=permanent building

I=interim (modular) structure

Noise data for the Bard Wall-Mount Air Conditioners was obtained from the manufacturer. There is a slight increase in noise levels with increasing cooling load. The reference sound pressure level at 50 feet from the unit as a function of capacity is as follows is shown on the data sheets in the appendix:

Up to 2 ton	45 dB
2.5 to 3 ton	48 dB
3.5 ton	49 dB
4 to 5 ton	50 dB

The distribution of capacity among the candidate units is not known. As a realistic worst-case, all units, except the seven units at the interim fellowship hall were assumed to be 3.0 tons, and every unit was assumed to run continuously for one hour. The seven fellowship hall units were assumed to be 2.0 ton units. The noise exposure for the interim configuration was calculated at the same analysis locations as for the permanent configuration. If the modular building completely obstructs the line-of-sight between the HVAC units and the patio of the nearest homes, their contribution to the noise exposure was assumed reduced by 15 dB by virtue of the 10-foot or so "sound wall" created by the modular unit. Because the wall-mounted air conditions at the interim administration facility may be close to the nearest home, they were assumed located on the walls farthest from the closest homes.

A reference noise level of 48 dBA at 50 feet was assigned to each assumed 3.0 ton unit. A reference noise level of 45 dB per unit was assigned to the interim fellowship hall HVAC system. The receiver pathway was measured, and any structural interference was estimated. Four source areas were considered as follows:

No.	Location	Reference Level (dBA)
7 units	Interim fellowship hall	$45 + 10 \log 7 = 53$
2 units	Portable classrooms – north	$48 + 10 \log 2 = 51$
2 units	Portable classrooms – south	$48 + 10 \log 2 = 51$
3 units	Interim administration building	$48 + 10 \log 3 = 53$

The worst-case noise exposure from the interim campus was calculated for the same receiver locations as for the permanent site layout for each of three alternative configurations. The source-receiver distances and any structural interference are included in the appendix. The resulting noise levels for each alternative are given in Tables 3 to 5. Daytime standards would be met with a large margin of safety. The more stringent nocturnal standard could be equal, but not exceeded at the “northern” property line (but not at the nearest patios) if every unit ran non-stop for one hour between 10:00 p.m. to 7:00 a.m.

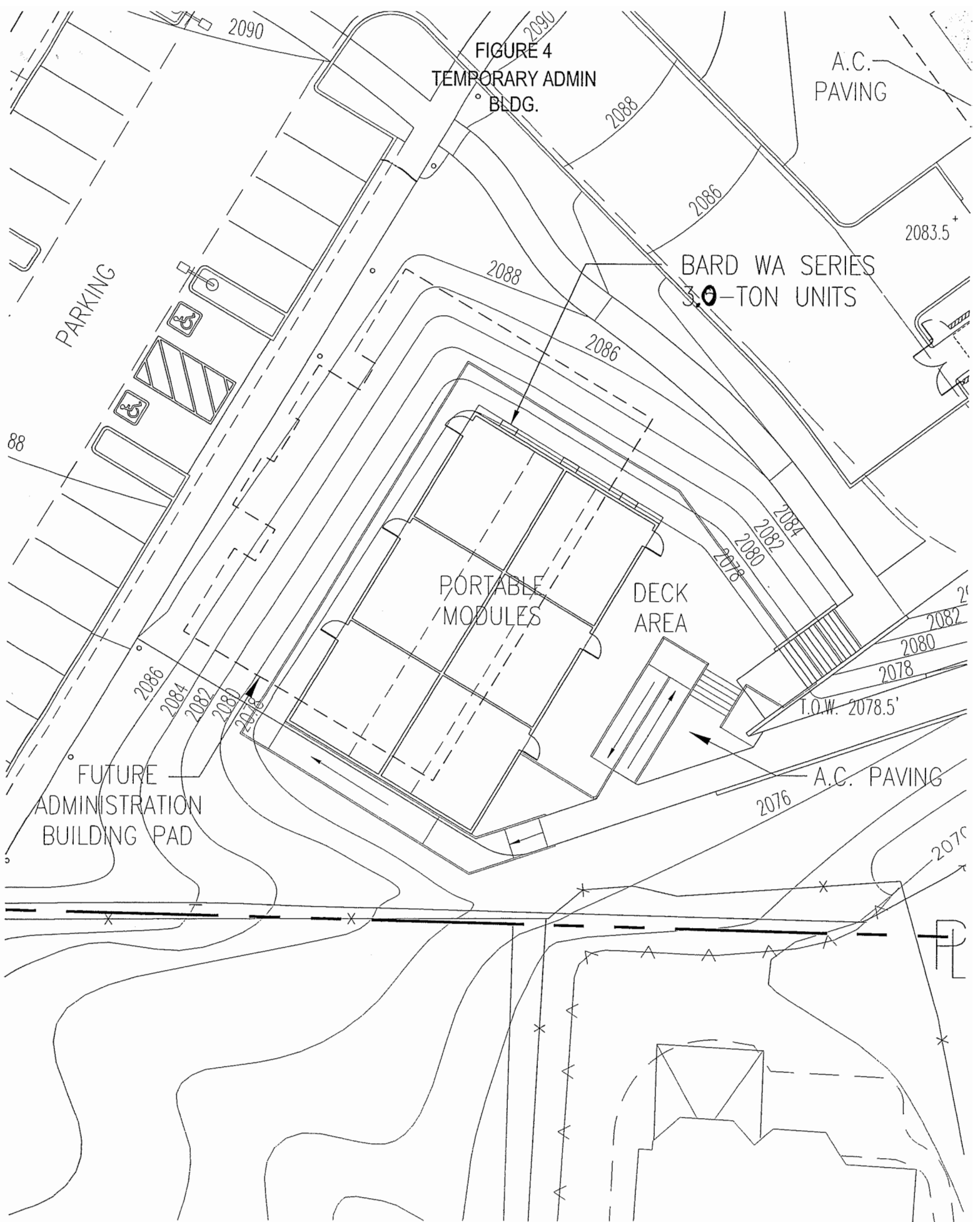


FIGURE 4  
TEMPORARY ADMIN  
BLDG.

A.C.  
PAVING

BARD WA SERIES  
3.0-TON UNITS

PORTABLE  
MODULES

DECK  
AREA

FUTURE  
ADMINISTRATION  
BUILDING PAD

A.C. PAVING

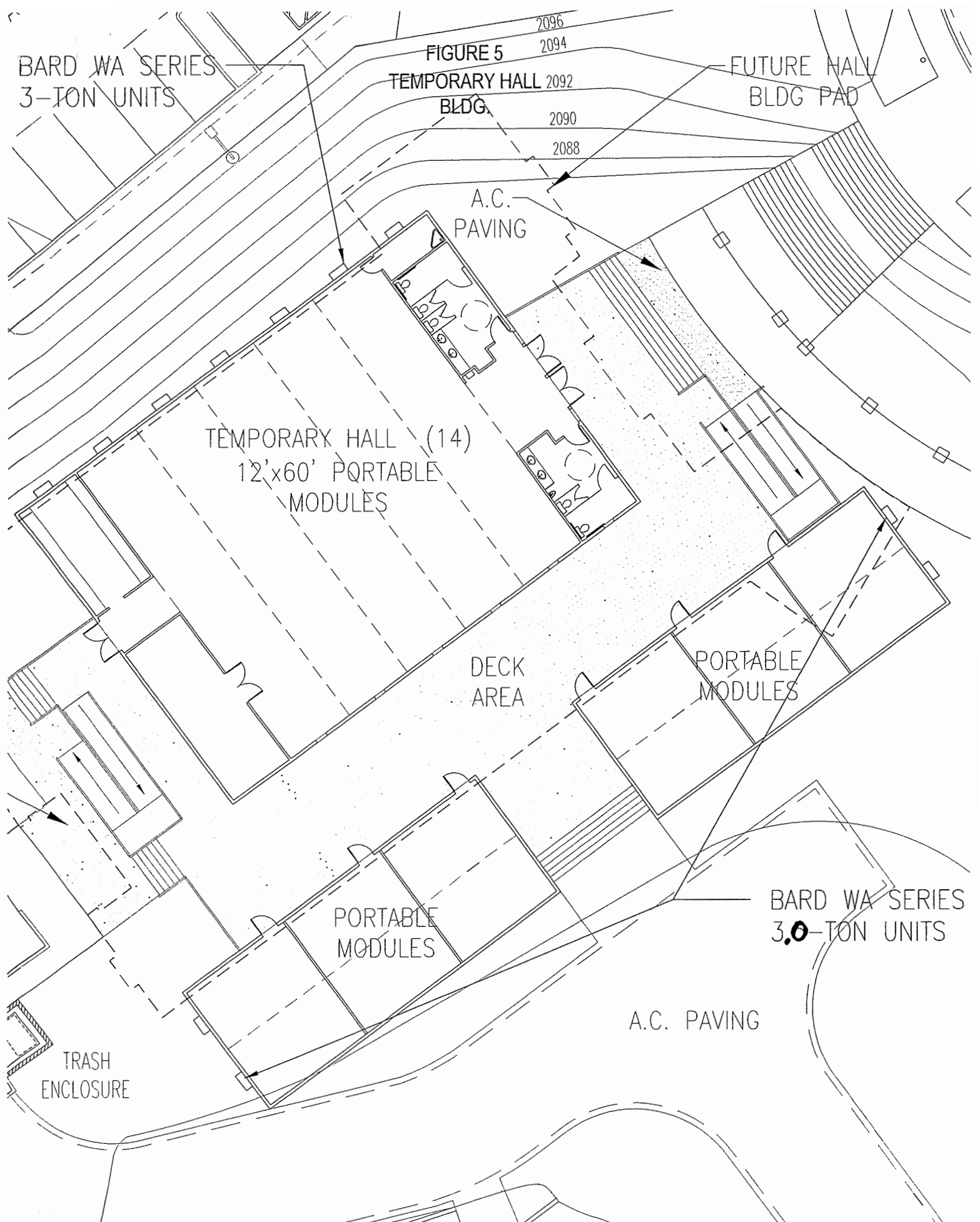


FIGURE 5

TEMPORARY HALL

BLDG

FUTURE HALL  
BLDG PAD

TEMPORARY HALL (14)  
12'x60' PORTABLE  
MODULES

DECK  
AREA

PORTABLE  
MODULES

PORTABLE  
MODULES

BARD WA SERIES  
3.0-TON UNITS

A.C. PAVING

TRASH  
ENCLOSURE

**Table 3**

**Interim Project (A) Off-Site Mechanical Equipment Noise<sup>2</sup>**

	Source Contribution (dBA) <sup>1</sup>							Total
	1	2	3	4	5	6	7	
<b>South House</b>								
Patio	34	33	11	24	21	41	32	43
Property Line	36	34	12	25	21	43	34	45
<b>Southwest House</b>								
Patio	35	29	9	19	34	18	33	40
Property Line	36	29	10	21	37	20	35	41
<b>East House</b>								
Patio	36	30	4	16	16	14	15	37
Property Line	38	33	6	17	18	16	16	39
<b>North House</b>								
Patio	35	33	1	34	35	15	16	40
Property Line	41	37	5	40	39	20	20	45

<sup>1</sup>Source 1 = East Sanctuary Wing

Source 2 = West Sanctuary Wing

Source 3 = Sanctuary Ground

Source 4 = Large temporary hall

Source 5 = Portables 1

Source 6 = Portables 2

Source 7 = Modular administration

<sup>2</sup>With screens on sanctuary roof.

Interim Project (A)=New sanctuary, modular hall, modular administration.

**Table 4**

**Interim Project (B) Off-Site Mechanical Equipment Noise<sup>2</sup>**

	Source Contribution (dBA)*						
	1	2	3	4	5	6	Total
<b>South House</b>							
Patio	34	33	11	23	16	32	38
Property Line	36	34	12	24	17	34	40
<b>Southwest House</b>							
Patio	35	29	9	27	17	33	39
Property Line	36	29	10	28	18	35	41
<b>East House</b>							
Patio	36	30	4	22	9	15	37
Property Line	38	33	6	22	11	16	39
<b>North House</b>							
Patio	35	33	1	29	19	16	38
Property Line	41	37	5	30	19	20	43

\*Source 1 = East Sanctuary Wing

Source 2 = West Sanctuary Wing

Source 3 = Sanctuary Ground

Source 4 = Hall Roof Well

Source 5 = Hall Subroof

Source 6 = Temporary Admin. Bldg.

<sup>2</sup>With sanctuary HVAC roof screens.

Interim Project (B)=New sanctuary, new hall, modular administration.

**Table 5****Interim Project (C) Off-Site Mechanical Equipment Noise<sup>2</sup>**

	Source Contribution (dBA) <sup>1</sup>							Total
	1	2	3	4	5	6	7	
<b>South House</b>								
Patio	34	33	11	24	21	41	29	43
Property Line	36	34	12	25	21	43	30	44
<b>Southwest House</b>								
Patio	35	29	9	19	34	18	38	41
Property Line	36	29	10	21	37	20	40	43
<b>East House</b>								
Patio	36	30	4	16	16	14	13	37
Property Line	38	33	6	17	18	16	13	39
<b>North House</b>								
Patio	35	33	1	34	35	15	13	40
Property Line	41	37	5	40	39	20	14	45

<sup>1</sup>Source 1 = East Sanctuary Wing

Source 2 = West Sanctuary Wing

Source 3 = Sanctuary Ground

Source 4 = Large temporary hall

Source 5 = Portables 1

Source 6 = Portables 2

Source 7 = New Administration Bldg.

<sup>2</sup>With sanctuary HVAC roof screens and administration HVAC sound wall.

Interim Project (C)=New sanctuary, modular hall, new administration.

## CONSTRUCTION

Project construction will create a noise from heavy equipment used for clearing, grading, excavation and building assembly. The noise level from equipment varies markedly, and a contractor has discretion in his and her selection of the equipment fleet to carry out the task. Any impact analysis is necessarily generic.

Construction activity noise occurs in discrete phases in response to the general types of activities. In hard-rock environments, drilling, blasting, excavation, hauling and possible crushing may be required. In softer soils, dozing, scraping and grading may be used to establish suitable building pads, parking lots, and other hardscape improvements. Some construction requires driven piles for building stability in soft soils, but that will not be required for this project.

The amount of hard rock that will be encountered is not fully known at this time. Rock processing through a crusher is the loudest semi-continuous activity. Crushing activity noise at 50 feet may be in the upper 80 dB range for the short term, and up to 85 dB over 8 hours at this distance. A setback of at least 160 feet from any off-site property line would be needed for rock crushing in order to maintain off-site noise levels at less than the County standard if extensive hard rock is encountered.

Grading activities will require a dozer, grader, backhoe, compactor, and perhaps an excavator. Dozers have short-term noise levels in the upper 80 dB range, but they have markedly variable duty cycles and often do not operate in one location for an 8-hour day. The maximum noise impact results when loud semi-mobile noise sources such as cranes or excavators operate within a confined area for much of the workday. Measurements of limited mobility activity such as excavation, loading and hauling at one fixed site have shown levels near 79 dB(A) over 8 hours at 50 feet from the excavator. This was assumed as a worst-case condition because such equipment may operate close to air adjacent property line. Such a source would exceed the San Diego County standard for any properties within 80 feet of the activity. There will be construction activities closer than as 80 feet from the property line within proximity of adjacent homes to the south of the proposed new administration building and the new sanctuary building.

Reduction of the property line equipment noise can be achieved by creating line of sight barriers to noise propagation, or by working less than eight hours close to the property line. Because of limited room between the construction area and the property line, time limits on equipment operations may be the most promising option. Equipment operating times that would achieve 75 dB(A) LEQ (8) for the assumed prototype are as follows:

<b>Distance to P.L. (feet)</b>	<b>Allowed Hours</b>
20	0.5
30	1.2
40	2.0
50	3.2
60	4.6
70	6.2
80	8.0

Time restrictions on equipment operations near the southern property line will maintain less-than-significant noise impacts at the nearest homes.

Temporary barriers can sometimes be erected to allow for construction close to residences without exceeding the noise performance standard. Heavy-weight fabric-covered batts supported by steel or telephone poles and cables are used with good success. These materials have sound transmission class (STC) ratings of 30 or better, and are often used around oil drilling rigs within populated areas. Depending upon source-receiver geometries, a barrier of 10 to 15 feet high would reduce noise by 10 dB or more. This would allow for semi-continuous construction with heavy equipment as close as 20 to 25 feet from adjacent property lines without exceeding the County noise performance standard.

A construction noise mitigation plan will be developed and approved by the Director of Planning and Land Use when specific equipment is identified, and detailed construction procedures are adopted. This plan will be required for any extended heavy equipment operations (more than 10 days) within 80 feet of any project perimeter property line.

Construction activities may adversely impact adjacent biotic habitats if noise-sensitive species are present during construction. This situation often occurs if gnatcatchers are nesting nearby during their breeding season. Gnatcatchers are not currently present. If they were found prior to construction, the following measure would/could be implemented:

1. Schedule heavy equipment operations to non-breeding season times. Because no threatened or endangered bird species have been observed during all biological survey (REC, 2003), this potential impact is likely a non-issue for biology. If protected bird species should be present, seasonal avoidance will be practical unless there are compelling reasons to perform grading or other heavy-equipment intensive operations that cannot be rescheduled. If protected birds should somehow appear, and if avoidance is impossible, then the following measures would be implemented.
2. Erect temporary barriers to interrupt the source-receiver line-of-sight.

3. Use smaller equipment operated intermittently.

If a non-avoidance construction practice is selected, noise monitoring near the affected habitat by a biologist trained in bird observation and in noise measurement practice is typically required to confirm the absence of any impacts.

## MITIGATION SUMMARY

1. Screen walls shall be constructed atop the sanctuary roof to shield the 38H034 units from northward noise propagation. The top of the walls as shown in Figure 2 shall be at 2,105 feet msl. A 2-inch gap at the bottom of each wall above the roof is allowed for drainage. The wall shall be constructed of 20-gauge sheet metal or acoustically equivalent material shown in Figure 2.
2. A 4-foot-high concrete masonry wall shall be erected to a top-of-wall height of 2,082 feet near the Administration Building air conditioning units as shown in Figure 3. Wall material shall exceed a surface density of 4.0 pounds per square foot.
3. The seven air conditioners for the interim fellowship hall shall be limited to 3.0 tons or less each, and shall be "Bard WH/WA" units or equivalent.
4. A construction noise mitigation plan shall be submitted and approved for any heavy equipment operations anticipated to occur for more than ten (10) workdays within 80 feet of any off-site property line.
5. If hard rock is encountered that requires crushing, the crusher shall maintain a set-back distance of at least 160 feet from any point to the nearest property line.
6. A construction noise impact mitigation plan shall be developed and approved by appropriate wildlife management agencies if nesting gnatcatchers are found near the site prior to construction.

## **APPENDIX**

- 1. SOUND32 Traffic Noise Computer Files**
  - 1a. West Victoria Traffic Noise SOUND 32 Model Input**
  - 1b. West Victoria Traffic Noise SOUND 32 Model Output**
- 2. Mechanical Equipment Data Sheets**
  - 2a. HVAC Equipment Spec. Sheet Transmittal\***
  - 2b. Sanctuary Mechanical Equipment Layout**
  - 2c. Admin. Building Equipment Layout**
  - 2d. Hall Building Equipment Layout**
  - 2e(1) Reznor Kitchen Hood Make-Up Air Fan Noise Data**
  - 2e(2) Kitchen Hood Exhaust Fan**
  - 2e(3) 38QRC Heat Pump Dimensional Data**
  - 2e(4) 38QRC Heat Pump Noise Data**
  - 2e(5) FB4A Fan Coil Unit Dimensional Data**
  - 2e(6) FB4A Fan Coil Unit Noise Data**
  - 2e(7) 50HS024 Package Heat Pump Unit Dimensional Data**
  - 2e(8) 50HS024 Package Heat Pump Unit Noise Data**
  - 2e(9) 50HJQ Package Heat Pump Unit Dimensional Data**
  - 2e(10) 50HJQ004 Package Heat Pump Unit Noise Data**
  - 2e(11) 50HJQ005 Package Heat Pump Unit Noise Data**
  - 2e(12) 50HJQ006 Package Heat Pump Unit Noise Data**
  - 2e(13) 50HJQ008 Package Heat Pump Unit Dim. Data**
  - 2e(14) 50HJQ004 Package Heat Pump Unit Noise Data**
  - 2e(15) 39M/Size 21 Air Handler Dimensional Data**
  - 2e(16) 39M/Size 21 Air Handler Supply Fan Noise Data**
  - 2e(17) 39M/Size 21 Air Handler Return Fan Noise Data**
  - 2e(18) 38H034 Condensing Unit Dimensional Data**
  - 2e(19) 38H034 Condensing Unit Noise Data**
- 3. Mechanical Equipment Noise Attenuation Calculations**
- 4. Modular Building HVAC Noise Ratings and Attenuation**

\*With annotation as to number of units, location and reference ARI sound rating.

Queen of Angels  
[-West Victoria, 1  
362 , 50 , 4 , 50 , 4 , 50  
[-Combined, 1  
√,37.,0,0,  
√,82.,189,0,  
√,163.,392,0,  
√,245.,498,0,  
√,326.,596,0,  
√,408.,694,0,  
√,490.,752,0,  
√,571.,792,0,  
√,653.,812,0,  
√,734.,832,0,  
√,816.,849,0,  
{, 1 , 67 ,500  
879,196,5.,NewAdmin  
{, 2 , 67 ,500  
69,294,5.,NewHall  
{, 3 , 67 ,500  
'02,306,5.,Plaza  
{, 4 , 67 ,500  
'75,310,5.,Church  
{, 5 , 67 ,500  
'02,204,5.,DevGardn  
{, 6 , 67 ,500  
16,714,5.,House  
{,C

TITLE:  
Queen of Angels

BASED ON FHWA-RD-108 AND  
CALIFORNIA REFERENCE ENERGY MEAN EMISSION LEVELS

RECEIVER	LEQ
NewAdmin	56.6
NewHall	56.3
Plaza	53.6
Church	52.9
DevGardn	52.7
House	58.5

# DIVISION 15 CONSULTING SERVICES

MECHANICAL/PLUMBING SYSTEMS DESIGN

May 24, 2002

Mr. Dennis Hyndman  
Hyndman & Hyndman Architecture  
2611 South Coast Hw'y 101, Suite 201  
Cardiff, CA 92007

Re: Queen of Angels Catholic Church - Alpine  
Preliminary HVAC Equipment Sizing/Location

Dear Dennis:

Please refer to the enclosed sketches for proposed HVAC equipment locations per the following schedule:

## *SANCTUARY BUILDING*

1. Carrier #38QRC024 Split System Heat Pump (outdoor section)
2. Carrier #FB4A024 Split System Fan-Coil Unit
3. Carrier #38H034 Split System Condensing Unit (outdoor section)
4. Carrier #39M Size 21 Split System Air Handling unit
5. Carrier #50HJQ005 Rooftop Package Heat Pump Unit
6. Carrier #50HJQ006 Rooftop Package Heat Pump Unit

## *ADMIN. BUILDING*

1. Carrier #38QRC024 Split System Heat Pump (outdoor section)
2. Carrier #FB4A024 Split System Fan-Coil Unit
1. Carrier #38QRC036 Split System Heat Pump (outdoor section)
2. Carrier #FB4A036 Split System Fan-Coil Unit
3. Carrier #38QRC048 Split System Heat Pump (outdoor section)
4. Carrier #FB4A048 Split System Fan-Coil Unit

## *HALL BUILDING*

1. Carrier #50HS024 Rooftop Package Heat Pump Unit
2. Carrier #50HJQ004 Rooftop Package Heat Pump Unit
3. Carrier #50HJQ005 Rooftop Package Heat Pump Unit
4. ~~Carrier #50HJQ006 Rooftop Package Heat Pump Unit~~
5. Carrier #50HJQ008 Rooftop Package Heat Pump Unit
6. Reznor RPB Kitchen Hood Make-Up Air Unit
7. Cook #VCR245-HP Rooftop (vertical discharge) Hood Exhaust Fan

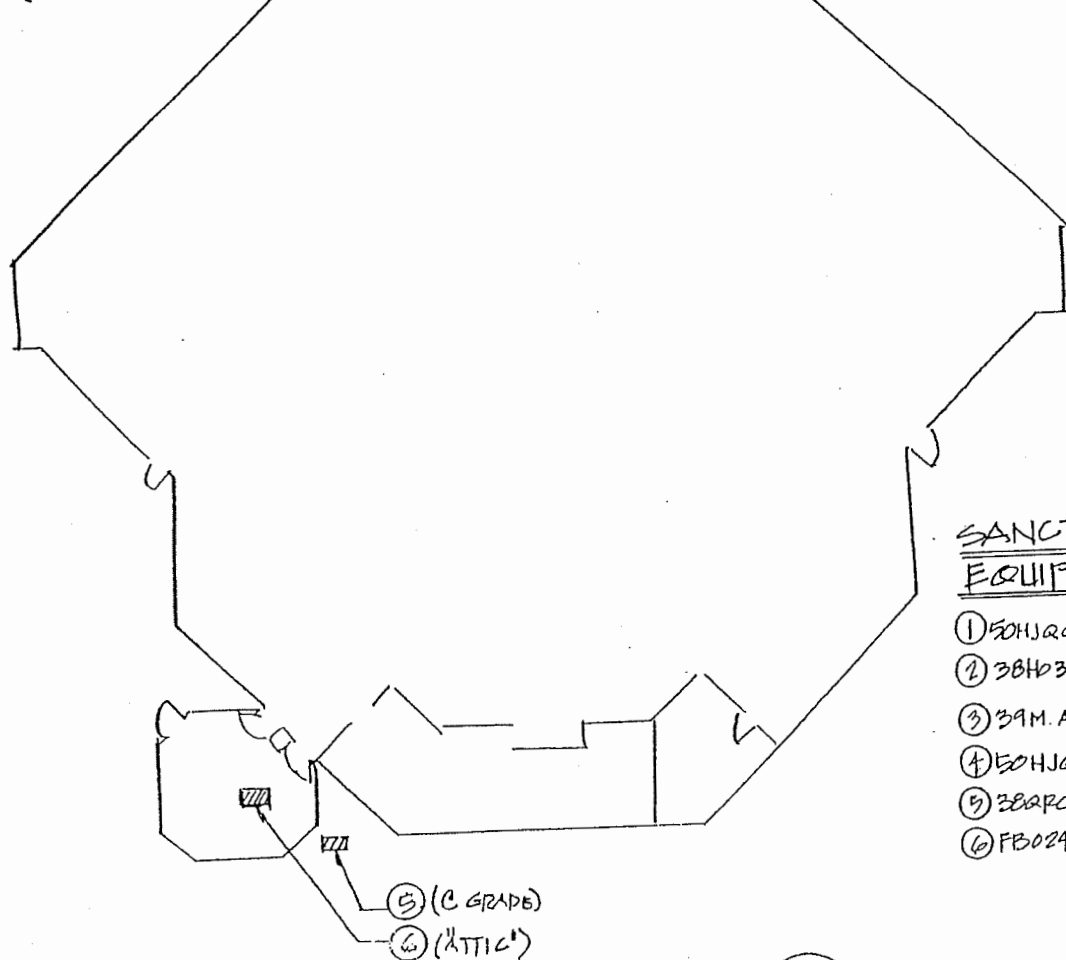
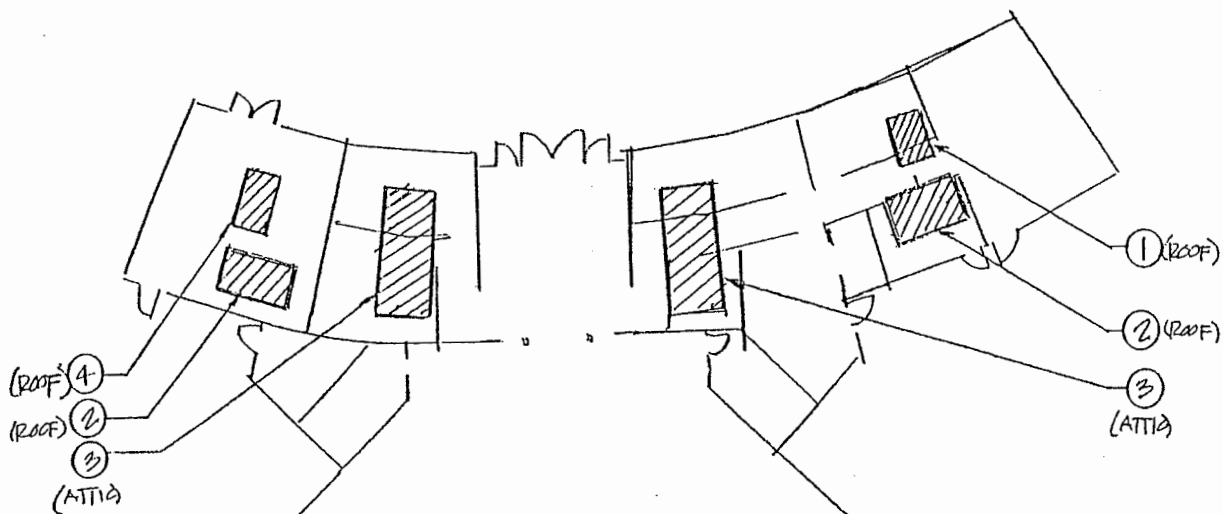
Manufacturers' sound data is also enclosed. This sound data is cataloged information. If additional sound data is needed please have your Acoustic Engineer call me at 619-670-3587.

Regards,

A handwritten signature in black ink, appearing to read "Tom Green", with a stylized flourish at the end.

Tom Green, Principal

TFG/ks

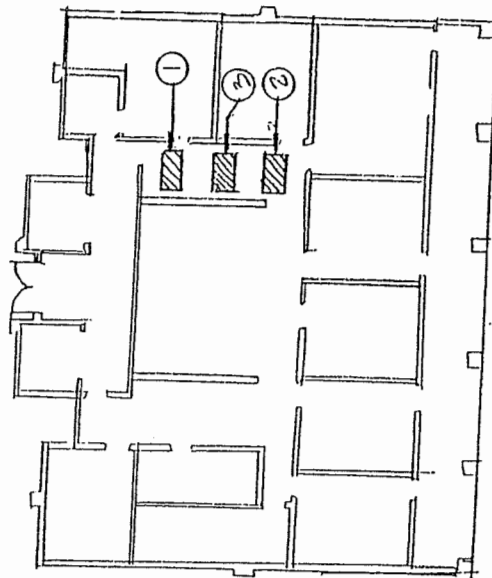


# SANCTUARY EQUIPMENT:

- ① 50HJQ006 R.T.U. 1
- ② 38H034 COND. UNIT 2
- ③ 39M. AIR HANDLER 2
- ④ 50HJQ003 1
- ⑤ 38QRC024 HEAT PUMP 1
- ⑥ FB024 FAH-CAL UNIT 1

SANCTUARY  
1/6" = 1'-0"



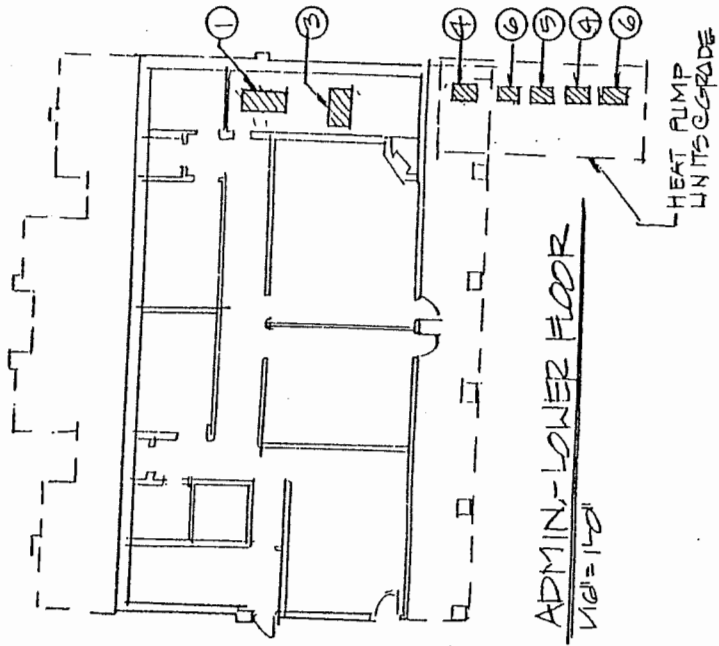


ADMIN - UPPER FLOOR  
VIG = 1-2

ADMIN BLDG.  
EQUIPMENT:

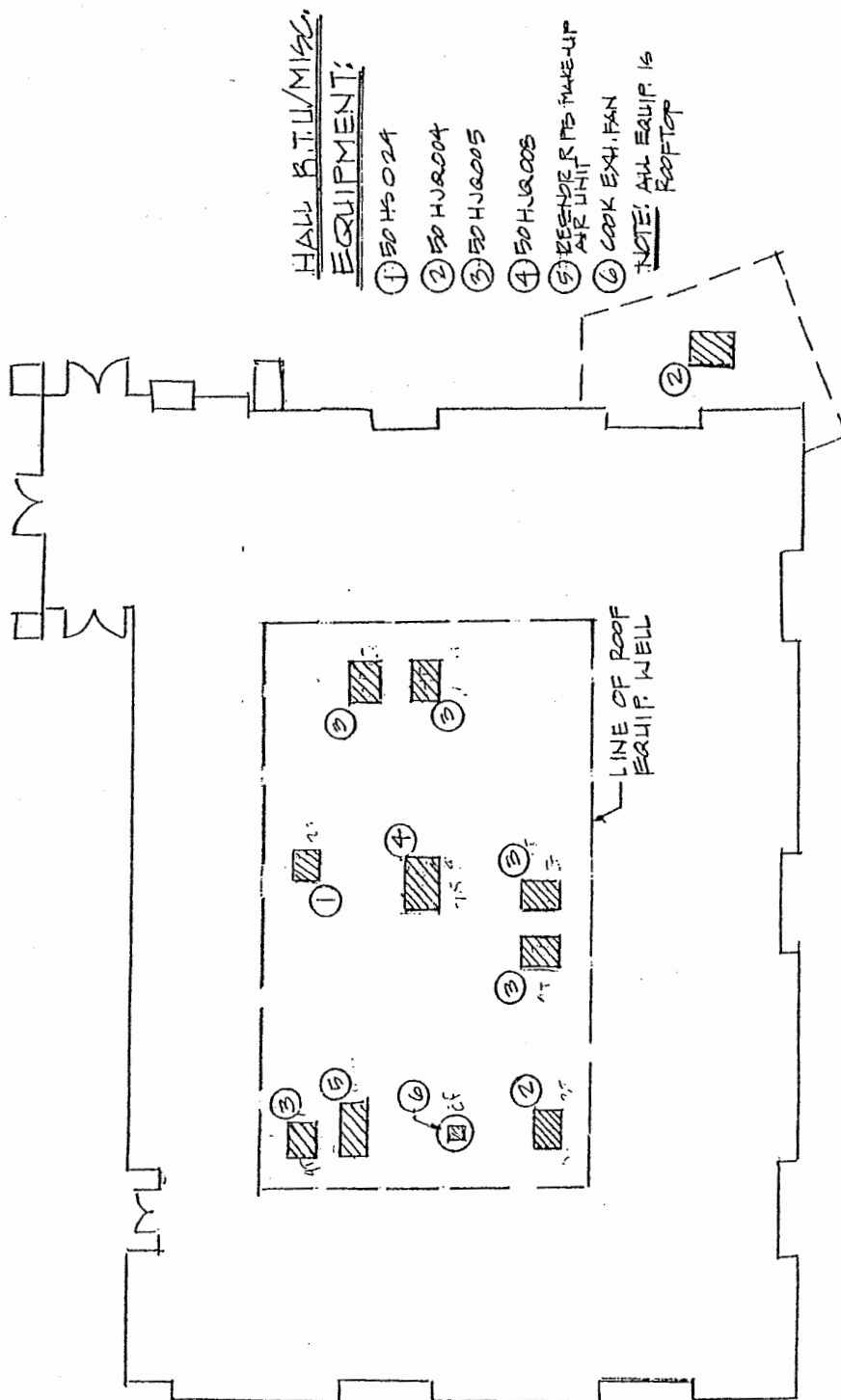
- ① FB4A024 FAN-COIL
- ② FB4A036 FAN-COIL
- ③ FB4A048 FAN-COIL
- ④ 33QR004 HEAT PUMP
- ⑤ 33QR008 HEAT PUMP
- ⑥ 33QR008 HEAT PUMP

NOTE: F-C UNITS ABOVE  
CEIL, OR IN ATTIC



ADMIN - LOWER FLOOR  
VIG = 1-2

HEAT PUMP  
UNITS GRADE



HALL B.T.U./MKS.

EQUIPMENT:

- ① BOHS024
- ② BOHJ004
- ③ BOHJ005
- ④ BOHJ008
- ⑤ DESANDER PS TAKE-UP AIR UNIT
- ⑥ COOK EXH. FAN

NOTE: ALL EQUIP. IS ROOFTOP

HALL  
10-1-11-01  
1/15-11-01

ound Data

ime/Date : 4/3/01 2:25:48 PM

ersion 4.1.0

odel: A12-12A

AN NOISE CALCULATION (dBA) -, 4000 CFM,  
1 ft elevation, 70 deg F, .075 lb/ft<sup>3</sup> density - Standard

Jason.  
REZNOR<sup>B</sup> RPB  
MAKE-UP AIR UNIT  
(HALL)

OCTAVE BAND No.	1	2	3	4	5	6	7	8
CT.CENTRE FRQCY (Hz)	63	125	250	500	1000	2000	4000	8000
PECIFIC SWL (dB)	38	44	39	36	39	37	32	31
OLOG Q+20LOG TP(dB)	45	45	45	45	45	45	45	45
FI (dB)	0	0	0	0	2	0	0	0
PF-PEAK CORR. (dB)	1	1	1	1	1	1	1	1
OTAL FAN SWL (dB)	85	90	85	82	87	83	78	77

. The A-weighted SWL in-duct is 90 dB.

. At a distance of 10 ft. from the fan, 73 dBA can be expected with an open inlet or outlet, and 58 dBA when the inlet and outlet are ducted.

These values have been assessed using a model of sound propagation from a point source into the hemispheric free field (see AMCA 303-79).

THE dBA VALUES PROVIDED ARE TO BE USED FOR REFERENCE ONLY. CALCULATION OF dBA VALUES COVER MATTERS OF SYSTEM DESIGN AND THE FAN MANUFACTURER HAS NO WAY OF KNOWING THE DETAILS OF EACH SYSTEM. THIS CONSTITUTES AN EXCEPTION TO ANY SPECIFICATION OR GUARANTEE REQUIRING A dBA VALUE OR SOUND DATA IN ANY OTHER FORM THAN SOUND POWER LEVEL RATINGS (SWL).

. The off-peak correction has been based on a static efficiency ratio of 0.904 (54 % / 60 %)

Sound generated by blower noise only @ std air

Richard J. Blasho  
Engineering Mgr.

# VCR-HP 245 SOUND DATA

RPM	SP	SOUND POWER re 10-12 WATTS									
		OCTAVE BANDS									
		1	2	3	4	5	6	7	8	LwIA	
970	.25	84	88	85	79	75	74	70	63	82	
	.75	82	87	83	77	73	72	68	62	81	
	1.25	81	85	81	75	71	70	66	61	79	
995	.25	85	88	85	80	75	75	71	64	83	
	.75	83	87	84	78	74	73	69	63	82	
	1.25	82	86	82	76	72	71	67	62	79	
1035	.25	85	89	86	81	77	76	72	65	84	
	.75	83	88	86	80	75	74	70	64	83	
	1.25	83	87	84	78	73	72	68	63	81	
	1.75	82	85	81	76	71	70	67	63	79	
1060	.25	86	89	87	82	77	76	73	66	85	
	.75	84	88	86	81	76	75	71	65	84	
	1.25	83	87	84	79	74	73	69	64	82	
	1.75	83	86	83	77	72	71	68	63	80	
1090	.25	86	90	88	83	78	77	74	67	86	
	.75	85	89	87	82	77	75	72	66	85	
	1.25	84	88	86	80	75	73	70	65	83	
	1.75	83	86	84	78	73	72	69	64	81	
1115	.25	87	90	88	83	79	77	74	68	86	
	.75	85	89	88	82	78	76	73	67	85	
	1.25	84	88	86	81	76	74	71	66	84	
	1.75	84	87	85	79	74	72	70	65	82	
1150	.25	87	90	89	84	79	78	75	69	87	
	.75	86	90	89	83	79	77	74	68	86	
	1.25	85	89	88	82	77	75	72	67	85	
	1.75	84	88	86	80	75	73	71	66	83	
1175	.25	88	91	90	85	80	79	76	70	88	
	.75	86	90	90	84	79	77	74	68	87	
	1.25	85	88	87	81	76	74	71	67	84	
1205	.25	88	91	91	86	81	79	77	70	88	
	.75	87	91	90	85	80	78	75	69	88	
	1.25	86	90	89	84	79	77	74	68	86	
	1.75	85	89	88	82	77	75	72	68	85	
	2.25	85	88	86	81	76	74	71	67	84	
1230	.25	89	92	91	86	81	80	77	71	89	
	.75	87	91	91	86	81	79	76	70	88	
	1.25	86	90	90	84	79	77	74	69	87	
	1.75	86	89	89	83	78	76	73	68	86	
1250	.25	89	92	92	87	82	80	78	72	89	
	.75	88	91	91	86	81	79	76	71	89	
	1.25	87	91	91	85	80	78	75	70	88	
	1.75	86	90	89	84	78	76	74	69	86	
	2.25	86	89	88	82	77	75	73	68	85	

# VCR-HP 270 SOUND DATA

RPM	SP	SOUND POWER re 10-12 WATTS									
		OCTAVE BANDS									
		1	2	3	4	5	6	7	8	LwIA	
550	.25	76	77	71	66	64	61	54	49	70	
570	.25	77	78	72	67	65	63	55	50	71	
585	.25	78	79	73	68	66	64	56	51	72	
605	.25	79	81	74	69	67	65	57	52	73	
625	.25	80	82	76	70	68	66	59	53	74	
640	.25	80	83	76	71	68	67	59	53	75	
655	.25	81	83	77	72	69	68	60	54	76	
	.75	77	80	72	66	65	64	55	53	72	
685	.25	82	85	79	73	70	69	62	56	77	
	.75	76	82	74	69	66	66	59	54	73	
710	.25	83	86	80	74	71	70	63	57	78	
	.75	77	82	76	70	68	67	61	55	75	
740	.25	84	87	81	75	72	71	64	58	80	
	.75	78	83	78	72	69	68	62	57	76	
775	.25	86	88	83	77	74	73	66	59	81	
	.75	79	84	80	74	71	70	64	58	78	
810	.25	87	89	84	78	75	74	67	61	82	
	.75	80	85	82	76	72	71	65	60	79	
845	.25	88	90	86	80	76	75	69	62	83	
	.75	81	86	83	77	74	73	67	61	81	
	1.25	81	85	81	74	71	70	66	60	78	
875	.25	89	91	87	81	77	76	70	63	85	
	.75	82	87	84	79	75	74	68	62	82	
	1.25	81	85	82	76	72	71	67	61	80	
900	.25	89	92	88	82	78	76	71	64	85	
	.75	83	87	86	80	76	74	69	63	83	
	1.25	81	86	83	77	74	72	68	62	81	
930	.25	90	92	89	83	79	77	72	65	86	
	.75	84	88	87	81	77	75	71	64	84	
	1.25	82	86	85	79	75	73	69	63	82	
955	.25	91	93	90	84	80	78	73	66	87	
	.75	85	89	88	82	78	76	72	65	85	
	1.25	82	87	86	80	76	74	70	64	83	
980	.25	91	94	91	85	80	79	74	67	88	
	.75	86	90	89	83	78	77	73	66	86	
	1.25	83	87	87	81	77	75	71	65	84	
1005	.25	92	94	92	85	81	79	75	68	89	
	.75	87	90	90	84	79	78	74	67	87	
	1.25	84	88	88	82	77	76	72	66	85	
1035	.25	92	95	93	86	82	80	76	69	89	
	.75	88	91	91	85	80	78	75	68	88	
	1.25	84	88	89	83	79	77	73	67	86	
1065	.25	93	96	94	87	82	81	77	70	90	
	.75	89	92	92	86	81	79	76	69	89	
	1.25	85	89	90	84	80	78	74	68	87	
	1.75	84	88	89	82	78	76	73	67	85	

The sound power level ratings shown are in decibels referred to 10<sup>-12</sup> watts calculated per AMCA Standard 301. Values shown are for LW<sub>i</sub> and LW<sub>o</sub>A sound power levels for free inlet, free outlet. Ratings do not include the effects of duct end correction. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.

# Base unit dimensions; 38BK018,024 and 38QR-C outdoor units

Carrier

38QR-C 024, 036, 048  
SPLIT SYSTEM  
HEAT PUMP  
(OUTDOOR SECTION)

UNIT	A		B		C		D		E		F		G		H		J		K		L		M		OPERATING WEIGHT	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	lb	Kg
38BK, 38QR-C024	2-1/8	538.2	3-0 3/16	938.2	1-2 3/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.5	0-11 3/4	295.3	0-9 3/4	15.88	167	75.7
38QR-C036	2-1/8	538.2	3-0 3/16	938.2	1-2 3/16	369.9	1-4	406.4	1-11 7/16	595.3	1-5 3/16	436.6	1-5 1/2	444.5	1-8 1/8	511.2	1-1	330.2	0-6 3/4	171.5	0-11 3/4	295.3	0-9 3/4	19.05	180	81
38QR-C048	3-13/16	944.6	3-8 9/16	1131.9	1-5 1/16	433.4	1-6 7/16	468.3	2-6 1/2	774.7	1-7 3/4	498.5	2-5 1/2	752.5	2-8 3/4	817.6	1-1 1/16	347.7	0-8 1/4	206.4	1-3 3/4	403.2	0-7 1/2	22.22	252	114.3

## MINIMUM MOUNTING PAD DIMENSIONS

### UNIT SIZE

### SUPPORT FEET

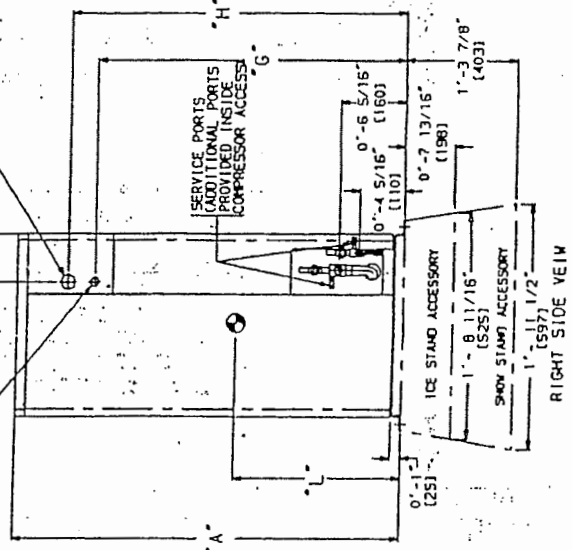
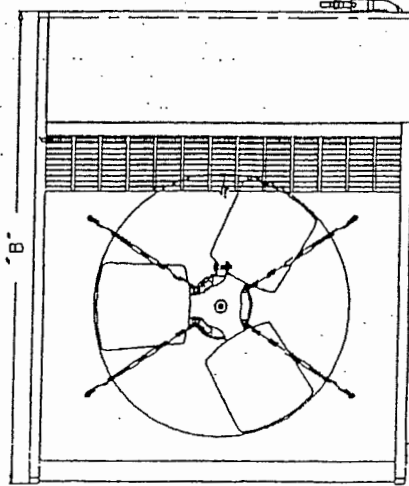
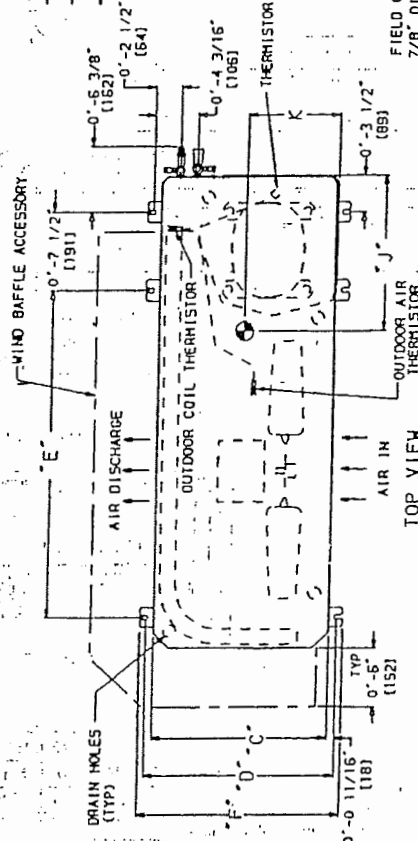
### Snow Stand

### Ice Stand

UNIT SIZE	SUPPORT FEET	Snow Stand	Ice Stand
018,024,030,036*	1-11 x 3-6	584.2 x 1066.8	2-2 x 3-6
036T,048,060	2-0 x 4-2	609.6 x 1270	2-4 x 4-4
			711.2 x 1270.0
			2-2 x 4-2
			660.4 x 1200.0
			660.4 x 1200.0

### NOTES:

- Required clearances, with coil facing wall; allow 6 in. minimum clearance on coil side and coil end, and 3 ft minimum clearance on compressor end and fan side. With fan facing wall; allow 8 in. minimum clearance on fan side and coil end, and 3 ft minimum clearance on compressor end and coil side. With multi unit application; arrange units so discharge of one does not enter inlet of another.
- Dimensions in [ ] are in millimeters.
- Center of gravity.
- Thermistors used with 40QNE fan coils only.



# Model number nomenclature (cont)



## SYSTEM AND COMPONENT AVAILABILITY

SYSTEM OR COMPONENT	SIZE							
	009	012	018	024	030	036	048	060
53QNE	X	X	X	X				
53QAE			X*	X	X†	X	X	X
53QKE			X*	X†	X†	X**		
38BK	X	X	X	X				
38QR-C			X	X	X	X	X	X
40QNE	X	X	X	X				
40QAE				X		X	X	X
40QKE				X		X	X	

\*Uses an 024 size indoor unit.

†Uses an 036 size indoor unit.

\*\*Uses an 048 size indoor unit.

NOTE: See Systems Index table, page 26 for a complete list of systems including components used for each.

**38QRC 024, 036, 048  
SPLIT SYSTEM HEAT PUMP  
(OUT DOOR SECTION)**

## ARI\* capacities

SYSTEM MODEL NO.	FAN COIL TYPE	INDOOR SECTION	OUTDOOR SECTION	STANDARD CFM	NET COOLING (BTUH)	TOTAL kW	SEER	EER	HIGH HEAT CAP (BTUH)	HIGH HEAT COP	HIGH HEAT HSPF	HEAT LOW CAP (BTUH)	HEAT LOW COP	OUTDOOR SOUND RATING (Decibels)
53QNE009	High Wall	40QNE009	38BK009	252	8,700	0.95	10.0	9.2	9,000	3.20	6.80	5,120	2.2	65
53QNE012	High Wall	40QNE012	38BK012	302	12,500	1.28	10.5	9.8	12,500	3.00	6.80	7,190	2.3	65
53QNE018	High Wall	40QNE018	38BK018	455	17,300	1.71	11.5	10.1	16,900	2.85	6.80	10,100	2.05	68
53QNE024	High Wall	40QNE024	38BK024	525	23,200	2.23	11.0	10.4	21,400	2.90	6.80	12,700	2.20	68
53QAE018	Ceiling Suspended	40QAE018	38QR-C018	525	18,000	2.00	10.00	9.0	17,600	3.04	6.80	11,000	2.0	68
53QAE024	Ceiling Suspended	40QAE024	38QR-C024	525	24,000	2.40	11.00	10.0	22,600	3.00	7.30	12,500	2.0	68
53QAE030	Ceiling Suspended	40QAE030	38QR-C030	525	29,000	2.61	11.50	10.2	27,000	3.27	7.60	15,900	2.3	68
53QAE036	Ceiling Suspended	40QAE036	38QR-C036 Single-Phase Unit	870	34,600	3.39	11.50	10.2	33,000	3.30	7.15	19,000	2.2	68
53QAE036	Ceiling Suspended	40QAE036	38QR-C036 3-Phase Unit	870	34,600	3.39	11.50	9.8	34,400	3.00	6.80	19,000	2.0	74
53QAE048	Ceiling Suspended	40QAE048	38QR-C048	1100	48,000	5.00	10.20	9.6	45,500	3.20	7.30	28,200	2.2	76
53QAE036	Ceiling Suspended	40QAE036	38QR-C036	525	29,000	2.61	11.50	9.9	27,000	3.27	7.60	15,900	2.3	68
53QKE018	In-Ceiling Cassette	40QKE018	30QR-C018	525	18,000	2.00	10.00	9.0	17,600	3.04	6.80	11,000	2.0	68
53QKE024	In-Ceiling Cassette	40QKE024	38QR-C024	525	25,000	2.44	10.70	10.2	23,800	3.34	7.60	13,400	2.3	68
53QKE030	In-Ceiling Cassette	40QKE030	38QR-C030	525	29,000	2.61	11.50	11.1	27,000	3.27	7.60	15,900	2.3	68
53QKE036	In-Ceiling Cassette	40QKE036	38QR-C036 Single-Phase Unit	1100	33,000	3.47	10.50	9.5	33,000	3.30	6.80	20,000	2.2	70
53QKE036	In-Ceiling Cassette	40QKE036	38QR-C036 3-Phase Unit	1100	34,400	3.65	10.00	9.2	34,000	3.00	6.80	21,000	2.0	74

### LEGEND

COP — Coefficient of Performance  
db — Dry-Bulb  
EER — Energy Efficiency Ratio  
HSPF — Heating Seasonal Performance Factor  
SEER — Seasonal Energy Efficiency Ratio  
wb — Wet-Bulb

ARI 210/240

ARI 270



(When used with  
matching unit.)

\*Air Conditioning & Refrigeration Institute.

### NOTES:

- Ratings are net values reflecting the effects of circulating fan heat. Supplemental electric heat is not included. Ratings are based on:  
Cooling Standard: 80 F db, 67 F wb indoor entering air temperature and 95 F db air entering outdoor unit.  
High-Temperature Heating Standard: 70 F db indoor entering air temperature and 47 F db, 43 F wb air entering outdoor unit.  
Low-Temperature Heating Standard: 70 F db indoor entering air temperature and 17 F db, 15 F wb air entering outdoor unit.
- Ratings are based on 15 ft of interconnecting refrigerant line.
- The total kW is for the total system, including compressor and indoor and outdoor fans.

## FAN-COIL UNITS



\* Descriptions and dimensions apply to all versions (FA4A, FB4A, and FC4B), unless otherwise specified.  
† Applicable for modular units only.

# FACTORY INSTALLED HEATER OPTIONS

MODEL	018	024	030	036	042	048	060
FA4ANF	5, 8, 10	5, 8, 10	5, 8, 10, 15	5, 8, 10, 15	8, 10, 15	8, 10, 15	10
FA4ANC*	5, 8, 10	5, 8, 10	5, 8, 10	5, 8, 10	8, 10	8, 10	10
FB4ANF	5, 8, 10	5, 8, 10	5, 8, 10, 15	5, 8, 10, 15	8, 10, 15	8, 10, 15	10

\* Includes factory-installed disconnect

## SYSTEM FAN-COIL UNITS

### FAN COIL ELECTRICAL DATA (UNITS WITHOUT ELECTRICAL HEAT)

UNIT SIZE	VOLTS (1 PHASE)	FLA†	MIN CKT AMPS	BRANCH CIRCUIT	
				Min Wire Size Awg*	Fuse Amps
018	208/230	1.5	1.9	14	15
024	208/230	1.8	2.3	14	15
030	208/230	2.4	3.0	14	15
036, 038	208/230	2.7	3.4	14	15
042, 054	208/230	2.9	3.7	14	15
048	208/230	4.3	5.4	14	15
060, 070	208/230	5.4	6.8	14	15
070	208/230	5.2	6.5	14	15

\* Use copper wire only. Use 75°C only in this application. When using non-metallic (NM) sheathed cable, wire size required should be based on that of 60°C conductors, instead of wire sizes shown in table above per NEC Article 336-26.

† Based on FB4A.

FLA — Full Load Amps

NOTE: If branch circuit wire length exceeds 100 ft, consult NEC 215-2 to determine maximum wire length. Use 2% voltage drop.

### ELECTRIC HEATER INTERNAL PROTECTION\*

HEATER KW	PHASE	FUSE QTY/SIZE	CKT BKR QTY/SIZE†
3	1	—	—
5	1	—	1/60
8	1	—	1/60
10	1	—	1/60
15	1	2/30 — 2/60	2/60
20	1	4/60	2/60
24	3/1	6/60	—
30	3/1	6/60	—
9	1/3	—	—
15	3	—	—
18	3	—	—

\* 5-, 8-, 10-kw factory-installed heat has no internal protection. 15-kw factory-installed heat is internally protected with fuses.

† Circuit breakers are 2 pole.

### ESTIMATED SOUND POWER LEVEL (dBA)

UNIT SIZE	CONDITIONS		Motor Rpm	OCTAVE BAND CENTER FREQUENCY*						
	CFM	Ext Static Pressure		63	125	250	500	1000	2000	4000
018	650	0.25	950	63	60	55	54	50	48	44
024	875	0.25	1075	64	60	56	53	53	49	45
030	1075	0.25	1075	65	61	57	54	54	50	46
036, 038	1300	0.25	1075	66	62	58	55	50	47	43
042, 054	1600	0.25	1075	67	63	59	56	56	52	48
048	1750	0.25	1075	67	63	59	56	56	52	48
060	2000	0.25	1100	68	64	60	57	57	53	49
070	2000	0.25	1075	68	64	60	57	57	53	49

\* Estimated sound power levels have been derived using the method described in the 1987 ASHRAE HVAC Systems & Applications Handbook, Chapter 52, p. 52.7.

SIZES 018-036 WITH OPTIONAL BASE RAIL

UNIT	ELECTRICAL CHARACTERISTICS	UNIT WT		CORNER WT (Lb/Kg)				UNIT HEIGHT (in./mm)	DIMENSION (in./mm)
		Lb	Kg	A	B	C	D	E	F
50HS018	208/230-1-60	208	122	70/31	58/26	102/46	50/23	27.43/697	21.50/546
50HS024	208/230-1-60	276	125	73/33	51/23	102/46	50/23	27.43/697	21.50/546
50HS030	208/230-1-60, 208/230-3-60	288	131	74/33	62/28	102/46	50/23	27.43/697	21.50/546
50HS036	208/230-1-60, 208/230-3-60, 460-3-60	308	140	76/35	68/31	101/46	63/29	31.43/798	25.50/648

UNIT	CENTER OF GRAVITY (in./mm)		
	X	Y	Z
50HS018	20.4/518	19.4/493	12.9/329
50HS024	20.2/513	19.5/495	12.9/329
50HS030	20.1/511	20.2/513	12.9/329
50HS036	20.0/508	20.3/515	14.7/373

REQ'D CLEARANCES FOR SERVICING — in. (mm)

Indoor Coil Access Side	30 (762)
Control Box Access Side	30 (762)
(Except for NEC requirements)	
Unit Top	36 (914)
Side Opposite Ducts	30 (762)

REQ'D CLEARANCES TO COMBUSTIBLE MAT'L — in. (mm)

Unit Top	0
Duct Side of Unit	0
Side Opposite Ducts	0
Bottom of Unit	0
Vertical Discharge, First 12 in. (305) of Supply Duct	1 (25)

NEC REQ'D CLEARANCES — in. (mm)

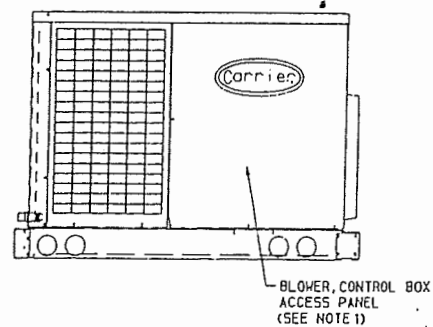
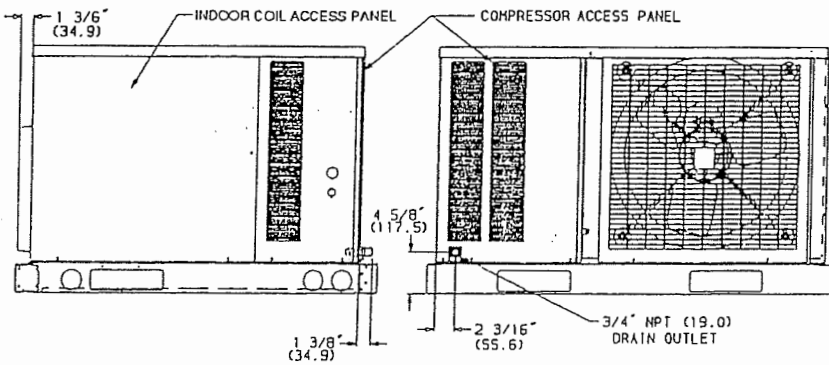
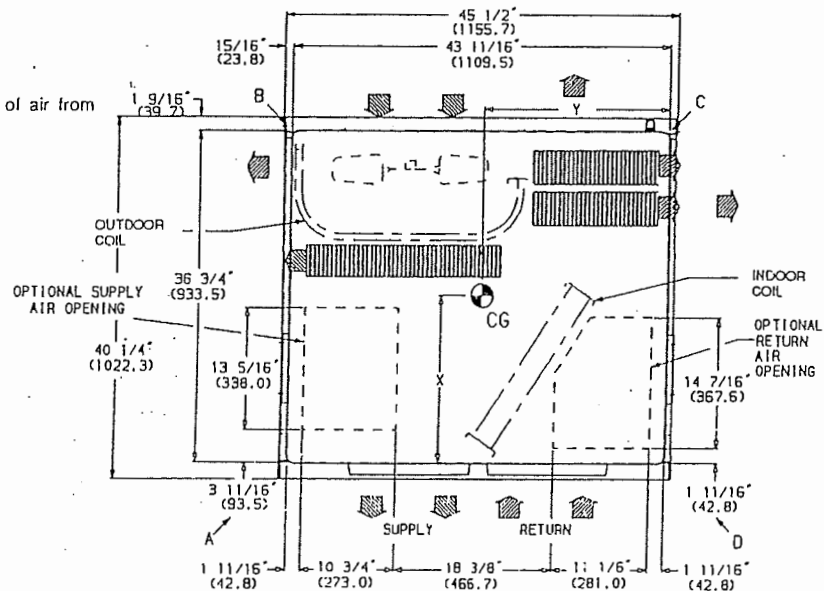
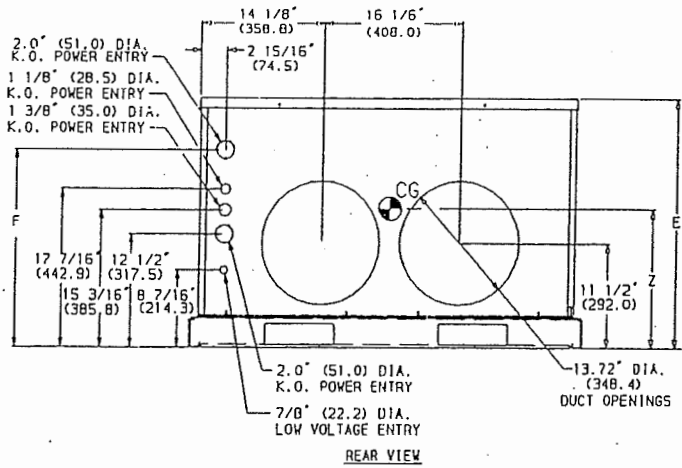
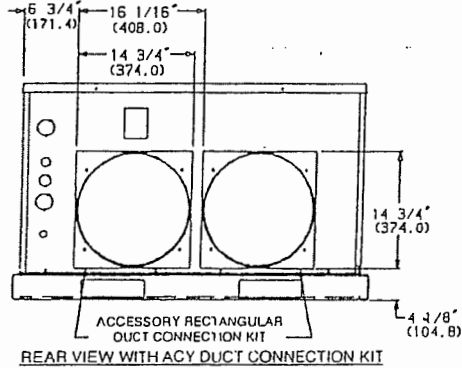
Between Units, Control Box Side	42 (1067)
Unit and Ungrounded Surfaces, Control Box Side	36 (914)
Unit and Block or Concrete Walls and Other Grounded Surfaces, Control Box Side	42 (1067)

LEGEND

CG	— Center of Gravity
MAT'L	— Material
NEC	— National Electrical Code
REQ'D	— Required

NOTES:

- Clearances must be maintained to prevent recirculation of air from outdoor-fan discharge.
- Dimensions in ( ) are in mm.



## COOLING AND HEATING CAPACITIES AND EFFICIENCIES

UNIT 50HS	NOMINAL TONS	STANDARD CFM	NET COOLING† CAPACITIES AT 95 F (Btuh)	SEER†	NET HEATING† CAPACITIES AT 47 F (Btuh)	COP† (at 47 F Btuh)	NET HEATING† CAPACITIES (at 17 F Btuh)	COP† (at 17 F Btuh)	HSPF	SOUND RATINGS** (Bels)
018	1 1/2	675	19,000	10.0	17,000	2.9	9,300	1.7	8.8	7.8
024	2	750	24,000	10.0	23,600	2.9	12,000	1.8	6.7	8.0
030	2 1/2	1000	29,000	10.0	28,400	3.0	15,000	1.8	6.8	8.0
036	3	1270	35,600	10.1	35,400	3.1	17,400	1.8	6.8	8.0
042	3 1/2	1420	42,000	10.0	40,000	3.0	20,000	1.9	6.8	8.2
048	4	1575	47,000	10.1	47,500	3.1	27,200	2.0	7.0	8.2
060	5	1995	57,500	10.0	57,000	3.2	32,000	2.0	7.0	8.2

## LEGEND

Bels — Sound Levels (1 bel = 10 decibels)  
 COP — Coefficient of Performance  
 DOE — Department of Energy  
 HSPF — Heating Seasonal Performance Factor  
 SEER — Seasonal Energy Efficiency Ratio

\*Air Conditioning & Refrigeration Institute.

†Rated in accordance with ARI Standard 210/240-89 and/or U.S. Government DOE test procedures.

\*\*Rated in accordance with ARI Standard 270-84.



## OUTDOOR SOUND: ONE-THIRD OCTAVE BAND DATA — DECIBELS

FREQ. Hz	UNIT 50HS						
	018	024	030	036	042	048	060
63	40.1	49.6	46.8	47.6	50.0	53.2	54.3
125	55.2	60.1	61.3	62.1	64.7	65.4	65.1
250	64.9	70.1	70.4	70.4	70.4	74.5	71.5
500	68.3	68.3	68.2	69.0	69.9	74.3	72.7
1000	71.2	72.6	74.1	72.2	75.3	75.2	73.9
2000	69.0	69.4	70.0	71.1	73.8	72.6	73.4
4000	64.7	67.8	68.9	70.3	75.1	68.6	71.7
8000	59.8	60.9	64.0	63.9	69.2	61.2	66.3

## Physical data

UNIT 50HS	018	024	030	036	042	048	060
REFRIGERANT Refrigerant Control*	R-22 Acutrol™ System						
SHIPPING WEIGHT (lb) Without Base Rails	333	256	288	288	359	359	373
With Optional Base Rails	268	276	288	308	379	379	393
COMPRESSOR TYPE	Reciprocating	Reciprocating	Reciprocating	Reciprocating	Reciprocating	Scroll	Scroll
INDOOR FAN Speeds	2	3	3	3	3	2	2
Rpm (High Speed)	825	1025	1025	1100	1100	1100	1100
Diameter (in.)	10	10	10	10	10	10	11
Width (in.)	9	9	9	9	10	9	9
Nominal Airflow (Cfm)	67	800	1000	1300	1400	1600	1995
Motor Hp	1/4	1/4	1/4	1/2	3/4	3/4	1
INDOOR COIL Rows...Fins/in. Face Area (sq ft)	3...15 1.60	3...15 2.30	3...15 3.00	3...15 2.70	3...15 4.50	3...15 4.50	4...15 4.50
OUTDOOR FAN Cfm	1700	1900	1900	1900	1900	2400	2400
Rpm	850	1050	850	1050	1050	1050	1050
Diameter (in.)	18	18	18	18	20	20	20
Motor Hp	1/4	1/4	1/4	1/4	1/4	1/2	1/2
OUTDOOR COIL Rows...Fins/in. Face Area (sq ft)	2...17 5.7	2...17 5.7	2...17 5.7	2...17 6.7	2...17 8.2	2...17 8.2	2...17 8.2
FILTER SIZE (in.)† Throwaway	20 x 20	20 x 20	20 x 24	24 x 24	24 x 30	24 x 30	24 x 30

\*Operating charge listed on unit nameplate.

†Recommended field-supplied filters are 1 in. thick.

UNIT	STD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
50HJQ004	500	227	123	56	127	58	127	58	124	56
50HJQ005	550	249	135	61	140	64	139	63	136	62
50HJQ006	590	268	145	66	150	68	150	68	145	66
50HJQ007	610	277	150	68	155	70	154	70	151	69



BOTTOM POWER CHART, THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGES — CRBTMPWR001A00 (1/2", 3/4") OR CRBTMPWR002A00 (1/2", 1 1/4")

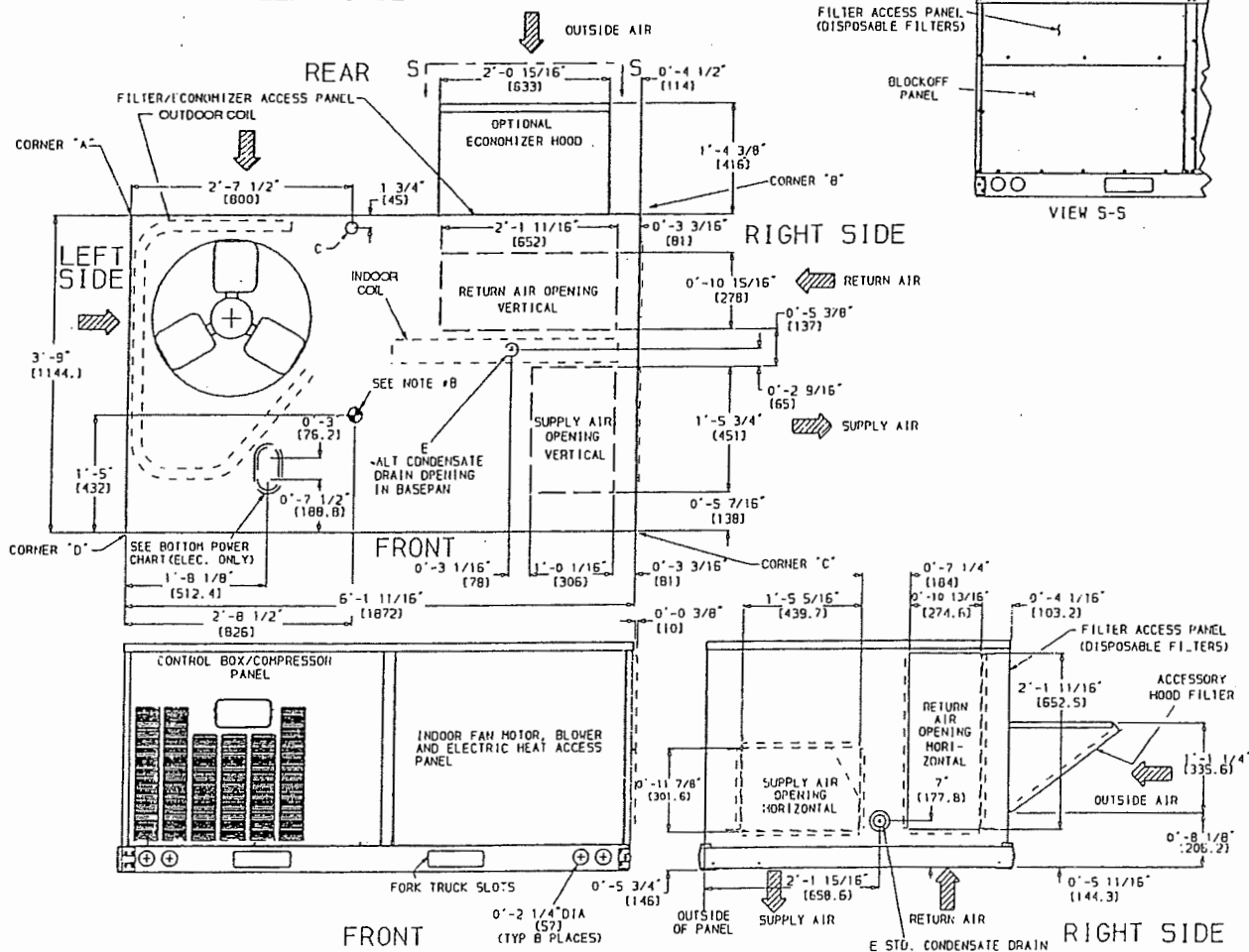
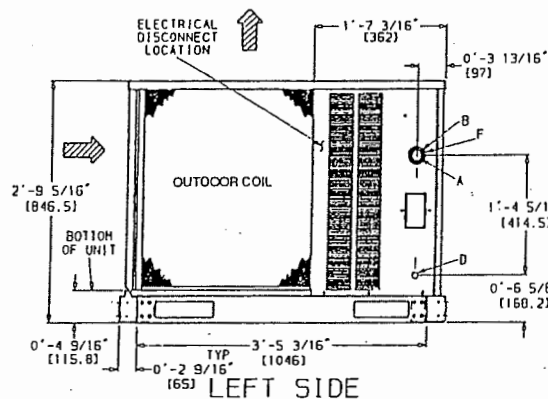
THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZE (MAX.)
1/2"	24V POWER*	1/2" [22.2]
3/4"	POWER*	1 1/4" [28.4]
1 1/4"	POWER*	1 3/4" [44.4]

\*Select either 3/4" or 1 1/4" for power, depending on wire size.

CONNECTION SIZES	
A	1 3/8" dia [35] field power supply hole
B	2" dia [51] power supply knockout
C	1 3/4" dia [44] charging port hole
D	3/8" dia [22] field control wiring hole
E	3/4" -14 NPT condensate drain
F	2 1/2" dia [64] power supply knockout

## NOTES:

- Dimensions in [ ] are in millimeters.
-  Center of gravity.
-  Direction of airflow.
- Ductwork to be attached to roof curb only.
- Minimum clearance (local codes or jurisdiction may prevail):
  - Bottom to combustible surfaces (when not using curb) 0 in. on horizontal discharge units with electric heat 1 in. clearance to ductwork for 1 foot.
  - Outdoor coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
  - Overhead, 60 in. to assure proper outdoor fan operation.
  - Between units, control box side, 42 in. per NEC (National Electrical Code).
  - Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
  - Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
  - Horizontal supply and return end, 0 inches.
- With the exception of the clearance for the outdoor coil as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
- Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.
- The vertical center of gravity is 1'-6 1/2" [470] up from the bottom of the base rail.



50HJ &amp; 004 K. I. L.

## Rooftop Pkg. Units Program Performance Summary

Project Name: Untitled  
 Prepared by : S.C.A.C.D.

5/23/2002

8:56:29 AM

Tag Name: 3 Tons  
 Unit Name: 50HJQ004

ARI SEER	12.00
Base Unit Weight	500 lb
Base Unit Dimensions:	
Length	73.7 in
Width	45.0 in
Height	33.3 in
Unit Voltage-Phase-Hertz	460-3-60
Air Discharge	Vertical
Fan Drive Type	Belt
Actual Airflow	1200 CFM
Site Altitude	0 ft
Condenser Entering Air DB	95.0 °F
Evaporator Entering Air DB	80.0 °F
Evaporator Entering Air WB	67.0 °F
Entering Air Enthalpy	31.44 Btu/lb
Evaporator Leaving Air DB	68.9 °F
Evaporator Leaving Air WB	57.1 °F
Leaving Air Enthalpy	24.47 Btu/lb
Gross Cooling Capacity	37.60 MBH
Gross Sensible Capacity	27.40 MBH
Compressor Power Input	2.78 kW
Coil Bypass Factor	0.170
Outdoor Ambient Temperature	47.0 °F
Entering Air Indoor Coil DB	70.0 °F
Leaving Air Indoor Coil DB	96.1 °F
Total Heating Capacity	33.80 MBH
Integrated Heating Capacity	33.80 MBH
Heating Power Input	2.93 kW
High Temp. COP	2.9
Low Temp. COP	2.1
HSPF	7.6
External Static Pressure	1.00 in wg
Fan RPM	1156
Fan Power	0.7 BHP

NOTE: Field Supplied Drive Required.

## Electrical Data:

Minimum Voltage	414
Maximum Voltage	508
Compressor #1 LRA	5.1
Compressor #1 LRA	39
Outdoor Fan FLA (ca)	.4
Indoor Fan Motor FLA	2.2
Power Supply MCA	9
Power Supply MOCP (Fuse or HACR)	15
Min. Unit Disconnect FLA	9
Min. Unit Disconnect LRA	46
Electrical Convenience Outlet	None

## Acoustics:

Sound Rating	7.6 Bels
--------------	----------

## Sound Power Levels, dB re 10E-12 Watts

		Discharge *	Inlet *	Outdoor Fan
63	hz	NA	NA	50.8
125	hz	NA	NA	63.4
250	hz	NA	NA	62.2
500	hz	NA	NA	65.9
1000	hz	NA	NA	69.2
2000	hz	NA	NA	65.9
4000	hz	NA	NA	63.0
8000	hz	NA	NA	56.5

\* - Indoor Fan

207106005 K.1.4.

**Rooftop Pkg. Units Program Performance Summary**

Project Name: Untitled  
Prepared by : S.C.A.C.D.

5/23/2002  
8:56:49 AM

Tag Name: 4Tons  
Unit Name: 50HJQ005

ARI SEER	12.00
Base Unit Weight	550 lb
Base Unit Dimensions:	
Length	73.7 in
Width	45.0 in
Height	33.3 in
Unit Voltage-Phase-Hertz	460-3-60
Air Discharge	Vertical
Fan Drive Type	Belt
Actual Airflow	1600 CFM
Site Altitude	0 ft
Condenser Entering Air DB	95.0 °F
Evaporator Entering Air DB	80.0 °F
Evaporator Entering Air WB	67.0 °F
Entering Air Enthalpy	31.44 Btu/lb
Evaporator Leaving Air DB	61.0 °F
Evaporator Leaving Air WB	57.7 °F
Leaving Air Enthalpy	24.85 Btu/lb
Gross Cooling Capacity	47.40 MBH
Gross Sensible Capacity	32.80 MBH
Compressor Power Input	3.65 kW
Coil Bypass Factor	0.160
Outdoor Ambient Temperature	47.0 °F
Entering Air Indoor Coil DB	70.0 °F
Leaving Air Indoor Coil DB	96.7 °F
Total Heating Capacity	46.10 MBH
Integrated Heating Capacity	46.10 MBH
Heating Power Input	4.04 kW
High Temp. COP	2.9
Low Temp. COP	2.0
HSPF	7.6
External Static Pressure	1.00 in wg
Fan RPM	1109
Fan Power	1.0 BHP
Electrical Data:	
Minimum Voltage	414
Maximum Voltage	508
Compressor #1 RLA	7.4
Compressor #1 LRA	49.5
Outdoor Fan FLA (ea)	.4
Indoor Fan Motor FLA	2.2
Power Supply MCA	11.9
Power Supply MOCP (Fuse or HACR)	15
Min. Unit Disconnect FLA	12
Min. Unit Disconnect LRA	57
Electrical Convenience Outlet	None

**Acoustics:**

Sound Rating 7.6 Bels

**Sound Power Levels, dB re 10E-12 Watts**

		Discharge *	Inlet *	Outdoor Fan
63	hz	NA	NA	50.8
125	hz	NA	NA	63.4
250	hz	NA	NA	62.2
500	hz	NA	NA	65.9
1000	hz	NA	NA	69.2
2000	hz	NA	NA	65.9
4000	hz	NA	NA	63.0
8000	hz	NA	NA	56.5

\* - Indoor Fan

# Rooftop Pkg Units Program Performance Summary

Project Name: Untitled  
Prepared by : S.C.A.C.D.

5/23/2002  
8:57:05 AM



Tag Name: 5Tons  
Unit Name: 50HJQ006

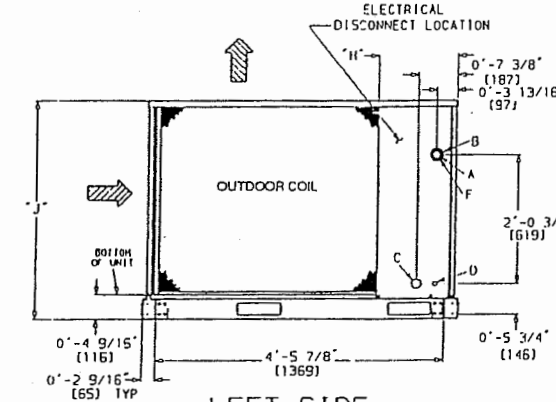
ARI SEER	11.90
Base Unit Weight	590 lb
Base Unit Dimensions:	
Length	73.7 in
Width	45.0 in
Height	33.3 in
Unit Voltage-Phase-Hertz	460-3-60
Air Discharge	Vertical
Fan Drive Type	Belt
Actual Airflow	2000 CFM
Site Altitude	0 ft
Condenser Entering Air DB	95.0 °F
Evaporator Entering Air DB	80.0 °F
Evaporator Entering Air WB	67.0 °F
Entering Air Enthalpy	31.44 Btu/lb
Evaporator Leaving Air DB	58.1 °F
Evaporator Leaving Air WB	57.2 °F
Leaving Air Enthalpy	24.53 Btu/lb
Gross Cooling Capacity	62.20 MBH
Gross Sensible Capacity	47.30 MBH
Compressor Power Input	4.70 kW
Coil Bypass Factor	0.050
Outdoor Ambient Temperature	47.0 °F
Entering Air Indoor Coil DB	70.0 °F
Leaving Air Indoor Coil DB	97.5 °F
Total Heating Capacity	59.30 MBH
Integrated Heating Capacity	59.30 MBH
Heating Power Input	4.87 kW
High Temp. COP	2.8
Low Temp. COP	2.2
HSPF	7.6
External Static Pressure	1.00 in wg
Fan RPM	1297
Fan Power	1.5 BHP

UNIT	STD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Fl.-in.	mm	Fl.-in.	mm	Fl.-in.	mm
50HJQ008	870	395	198	90	183	83	237	108	252	114	2'-0 7/8"	632	3'-5 5/8"	1050	2'-9 1/8"	856
50HJQ012	1000	454	231	105	214	97	269	122	286	130	2'-1 1/8"	685	3'-7 1/8"	1120	2'-10 1/8"	924

CONNECTION SIZES	
A	1 3/8" dia [35] field power supply hole
B	2 1/2" dia [64] power supply knockout
C	1 3/4" dia [44] charging port hole
D	7/8" dia [22] field control wiring hole
E	3/4" -14 NPT condensate drain
F	2" dia [51] power supply knockout

NOTES:

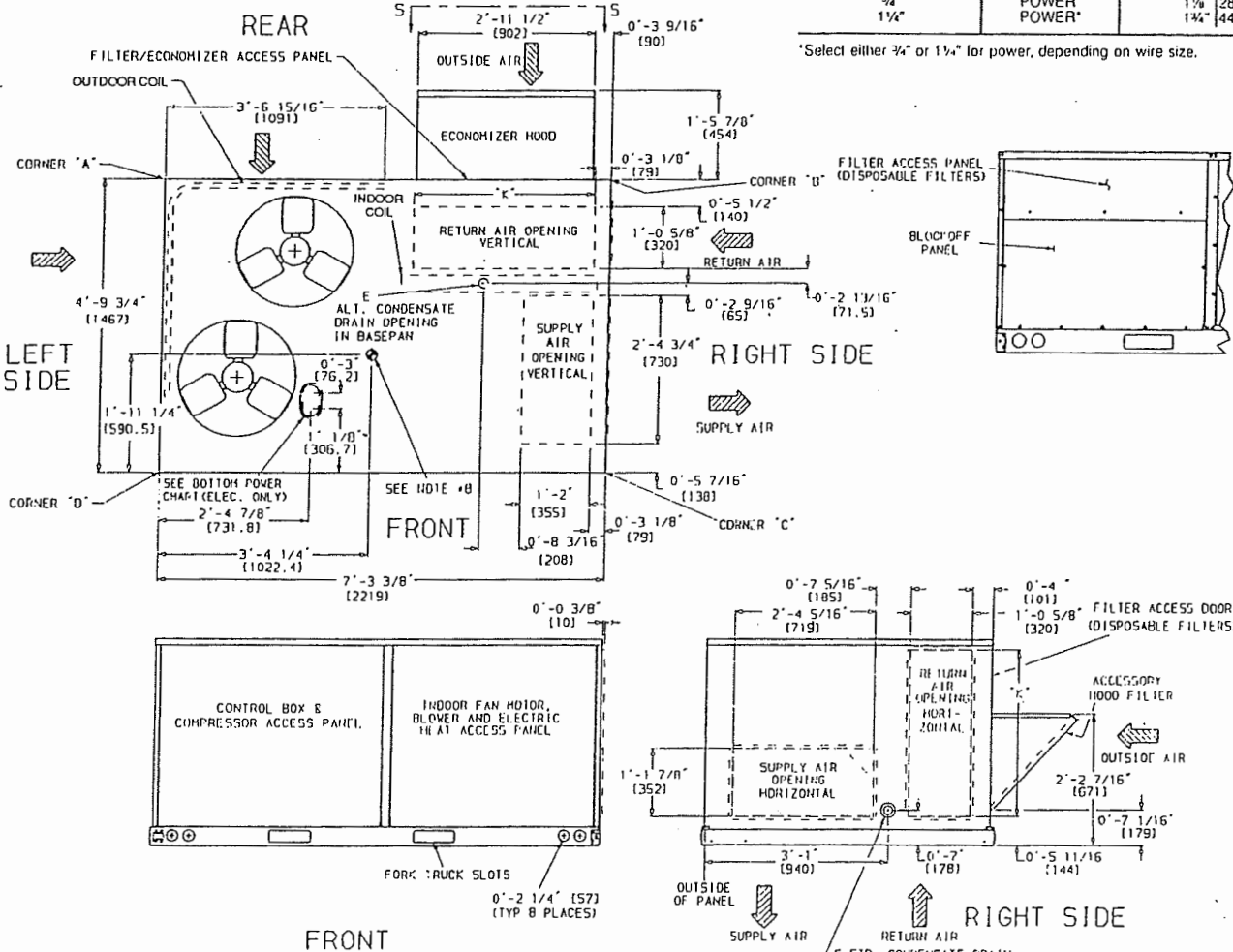
- Dimensions in [ ] are in millimeters.
-  Center of gravity.
-  Direction of airflow.
- Ductwork to be attached to accessory roof curb only.
- Minimum clearance (local codes or jurisdiction may prevail):
  - Bottom to combustible surfaces (when not using curb) 0 in. on horizontal discharge units with electric heat 1 in. clearance to ductwork for 1 foot.
  - Outdoor coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
  - Overhead, 60 in. to assure proper outdoor fan operation.
  - Between units, control box side, 42 in. per NEC (National Electrical Code).
  - Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
  - Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
  - Horizontal supply and return end, 0 inches.
- With the exception of the clearance for the outdoor coil as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
- Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.
- The vertical center of gravity is 1'-7 1/8" for 008, 2'-0" for 012 up from the bottom of the base rail.



BOTTOM POWER CHART, THESE HOLES REQ'D FOR USE WITH ACCESSORY PACKAGES — CRBTPWR001A00 (1/2", 3/4") OR CRBTPWR002A00 (1/2", 1 1/4")

THREADED CONDUIT SIZE	WIRE USE	REQ'D HOLE SIZES (MAX.)
1/2"	24V	1/4" [22.2]
3/4"	POWER*	1 1/4" [28.4]
1 1/4"	POWER*	1 3/4" [44.4]

\*Select either 3/4" or 1 1/4" for power, depending on wire size.



## Rooftop Pkg. Units Program Performance Summary

Project Name: Untitled  
Prepared by : S.C.A.C.D.

5/23/2002  
8:57:29 AM

Tag Name: 7.5Tons  
Unit Name: 50HJQ008

ARI EER	10.30
Base Unit Weight	870 lb
Base Unit Dimensions:	
Length	87.4 in
Width	57.8 in
Height	41.3 in
Unit Voltage-Phase-Hertz	460-3-60
Air Discharge	Vertical
Fan Drive Type	Belt
Actual Airflow	3000 CFM
Site Altitude	0 ft
Condenser Entering Air DB	95.0 °F
Evaporator Entering Air DB	80.0 °F
Evaporator Entering Air WB	67.0 °F
Entering Air Enthalpy	31.44 Btu/lb
Evaporator Leaving Air DB	59.2 °F
Evaporator Leaving Air WB	57.4 °F
Leaving Air Enthalpy	24.67 Btu/lb
Gross Cooling Capacity	91.30 MBH
Gross Sensible Capacity	67.50 MBH
Compressor Power Input	7.41 kW
Coil Bypass Factor	0.150
Outdoor Ambient Temperature	47.0 °F
Entering Air Indoor Coil DB	70.0 °F
Leaving Air Indoor Coil DB	97.0 °F
Total Heating Capacity	87.50 MBH
Integrated Heating Capacity	87.50 MBH
Heating Power Input	8.03 kW
High Temp. COP	3.3
Low Temp. COP	2.2
External Static Pressure	1.00 in wg
Fan RPM	862
Fan Power	2.2 BHP
Electrical Data:	
Minimum Voltage	414
Maximum Voltage	508
Compressor RLA (ea)	6.4
Compressor LRA (ea)	44
Outdoor Fan Motor Qty	2
Outdoor Fan FLA (ea)	.7
Indoor Fan Motor FLA	3.4
Power Supply MCA	19.2
Power Supply MOCP (Fuse or HACR)	20
Min. Unit Disconnect FLA	20
Min. Unit Disconnect LRA	121
Electrical Convenience Outlet	None

## Acoustics:

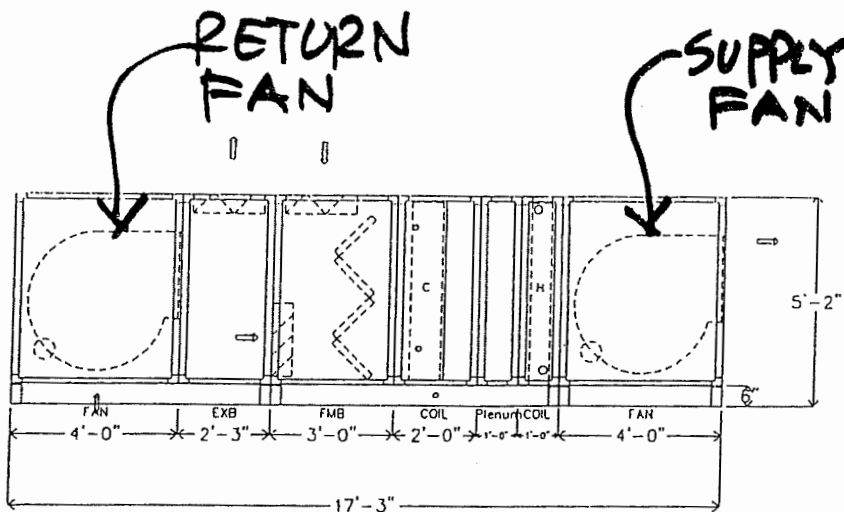
Sound Rating 8.2 Belc

## Sound Power Levels, dB re 10E-12 Watts

		Discharge	Inlet	Outdoor Fan
63	hz	NA	NA	62.3
125	hz	NA	NA	69.3
250	hz	NA	NA	71.5
500	hz	NA	NA	74.7
1000	hz	NA	NA	76.2
2000	hz	NA	NA	72.9
4000	hz	NA	NA	68.7
8000	hz	NA	NA	61.5

\* - Indoor Fan

3 HP High Efficiency TEFC 200/230/460 3Ph 60Hz 1800 RPM  
 Direct Expansion 8 rows 14 fpi row-split full-circuit  
 Hot Water 2 rows 8 fpi half-circuit  
 Draw-Thru Supply Fan  
 7.5 HP Premium Efficiency TEFC 200/230/460 3Ph 60Hz 1800 RPM  
 Operating weight: 4874.0 lbs.



DATE  
5/23/2002

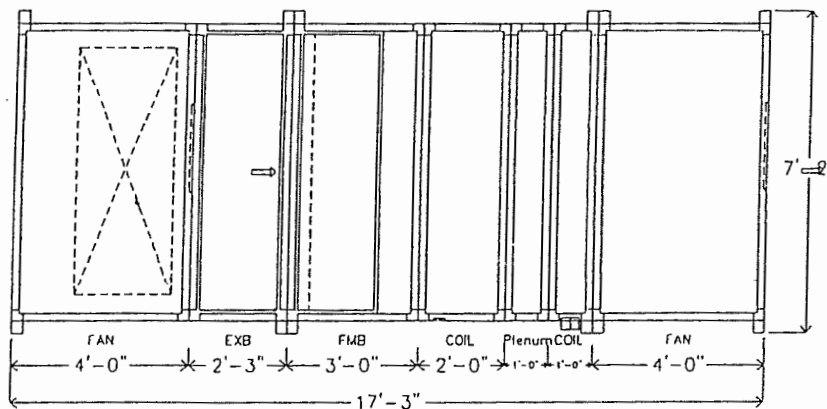
Configurator Ver.  
v5.09 12/11/2001

39M Central Station Air-Handler, Size: 21  
 SANCTUARY - Div 15: 3BAHQ34 & 8 Rows  
 ASSEMBLY DRAWING

REVISION  
Side View

39M

Return Fan  
 3 HP High Efficiency TEFC 200/230/460 3Ph 60Hz 1800 RPM  
 Direct Expansion 8 rows 14 fpi row-split full-circuit  
 Hot Water 2 rows 8 fpi half-circuit  
 Draw-Thru Supply Fan  
 7.5 HP Premium Efficiency TEFC 200/230/460 3Ph 60Hz 1800 RPM  
 Operating weight: 4874.0 lbs.



DATE  
5/23/2002

Configurator Ver.  
v5.09 12/11/2001

39M Central Station Air-Handler, Size: 21  
 SANCTUARY - Div 15: 3BAHQ34 & 8 Rows  
 ASSEMBLY DRAWING

REVISION  
Top View

39M

39M AIR HANDLER  
 (Sanctuary) SIZE 21

# AHU Selection Program Performance Summary (Supply Fan)

Project Name: Untitled

5/23/2002

8:42:26 AM

Air Handler Unit: 39M

Tag Name: Untitled 5/23/2002 8:2

Unit Size 21  
Fan Type FORWARD CURVED  
Fan Wheel Diameter STANDARD  
Fan Class I  
Fan Application Draw Thru  
Orientation Horizontal

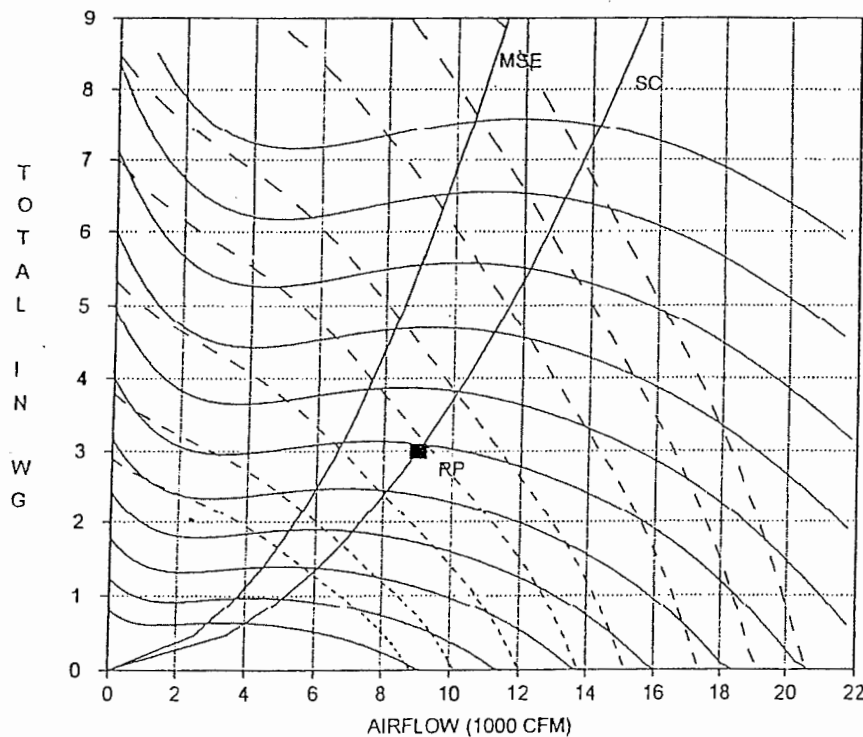
## Acoustic Data:

	Discharge	Inlet	Casing
63 Hz	93	85	85
125 Hz	93	75	79
250 Hz	89	70	70
500 Hz	87	67	65
1000 Hz	83	66	67
2000 Hz	75	64	62
4000 Hz	69	56	56
8000 Hz	60	44	50

Actual Airflow, CFM 9000  
Site Altitude, ft 0  
Upstream Ext. Static, in wg 0.00  
Downstream Ext. Static, in wg 1.50  
Cooling Coil Static, in wg 0.92  
Heating Coil Static, in wg 0.15  
Other Losses, in wg 0.16  
Total Accessory Static, in wg 0.27  
Total Static Pressure, in wg 3.00  
Calculated Fan RPM / Motor RPM 887 / 1800  
Class I Max. RPM 1002  
Fan BHP / Motor HP 7.0 / 7.5

## Accessories:

- (1) Filter Mixing Box 2 " Throw [0.04]
- (2) Mixing or Exhaust Box Prem Damper [0.23]



## Legend:

- RPM

- BHP

MSE - Max. Static Eff.

SC - System Curve

RP - Rated Point

CLASS I MAX. RPM = 1002

RPM's (x 100, Top to Bottom): 14 13 12 11 10 9 8 7 6 5 4

BHP's (Left to Right): 2 3 5 7.5 10 15 20 25

# AHU Selection Program Performance Summary (Return Fan)

Project Name: Untitled

5/23/2002

8:32:16 AM

Air Handler Unit: 39M

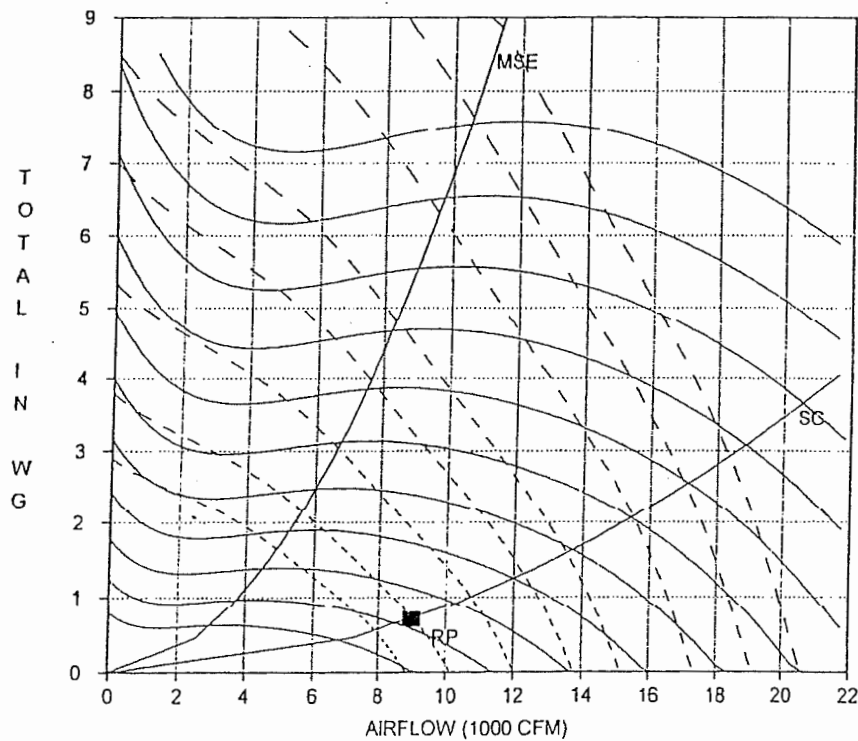
Tag Name: Untitled 5/23/2002 8:2

Unit Size	21
Fan Type	FORWARD CURVED (Return)
Fan Wheel Diameter	STANDARD
Fan Class	I
Fan Application	Draw Thru
Orientation	Horizontal
Actual Airflow, CFM	9000
Site Altitude, ft	0

## Acoustic Data:

	Discharge	Inlet	Casing
63 Hz	76	67	67
125 Hz	75	57	61
250 Hz	71	52	52
500 Hz	68	48	46
1000 Hz	62	45	46
2000 Hz	57	46	44
4000 Hz	50	37	37
8000 Hz	42	26	32

Total Upstream Static Losses, in wg	0.70
Calculated Fan RPM / Motor RPM	522 / 1800
Class I Max. RPM	1002
Fan BHP / Motor HP	2.9 / 3.0



## Legend:

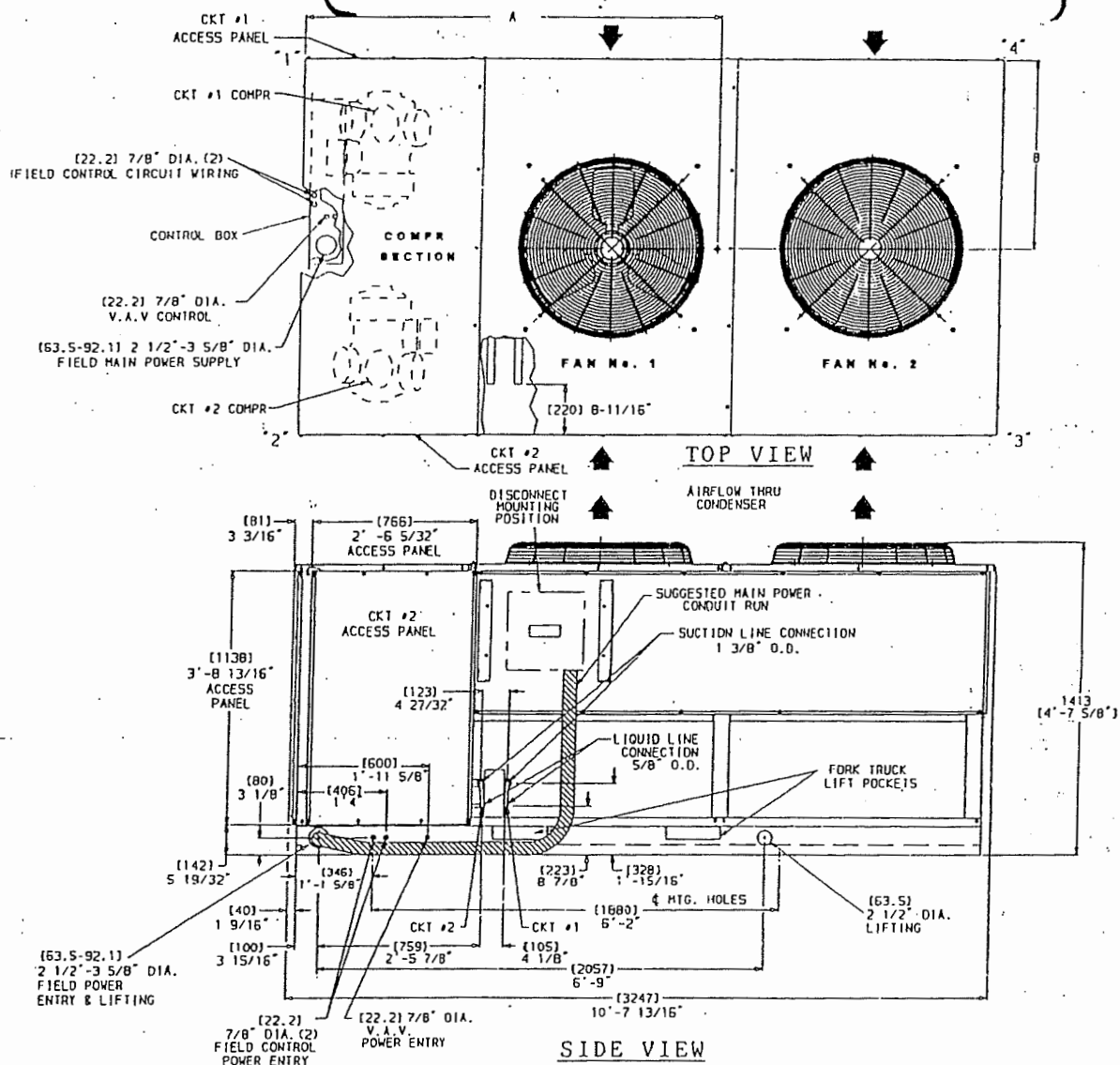
- RPM      - BHP      MSE - Max. Static Eff.      SC - System Curve      RP - Rated Point

CLASS I MAX. RPM = 1002

RPM's (x 100, Top to Bottom): 14 13 12 11 10 9 8 7 6 5 4

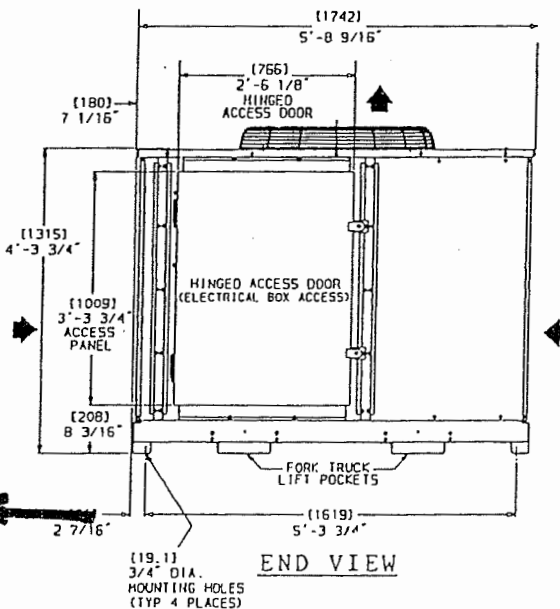
BHP's (Left to Right): 2 3 5 7.5 10 15 20 25

# (SPLIT SYS. CONDENSING UNIT)



- NOTES:**
1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
  2. There must be minimum 8 ft [2440 mm] clear air space above unit.
  3. "C" in the package number indicates copper coils.
  4. Dimensions in [ ] are in millimeters.
  5. The approximate operating weight of the unit is shown below.
  6. Certified dimensional drawing is available on request.

UNIT 38AH	CORNER WEIGHT — lb [kg]				CENTER OF GRAVITY		TOTAL UNIT WT lb [kg]
	"1"	"2"	"3"	"4"	A Dim. In. [mm]	B Dim. In. [mm]	
024	631.6 [286.5]	577.6 [262.0]	263.1 [119.3]	287.7 [130.5]	40.00 [1016]	32.75 [832]	1760 [798.3]
024C	666.5 [302.3]	609.5 [276.5]	309.0 [140.2]	337.9 [153.3]	43.00 [1092]		1923 [872.3]
028	658.7 [298.8]	602.4 [273.3]	267.0 [121.1]	291.9 [132.4]	39.25 [997]		1820 [825.6]
028C	692.0 [314.3]	633.8 [287.3]	313.0 [142.0]	342.2 [155.2]	42.25 [1073]		1923 [872.3]
034	667.0 [302.5]	610.0 [276.7]	288.0 [130.7]	315.0 [142.9]	41.00 [1041]		1880 [853.0]
	718.3 [325.8]	655.8 [297.9]	311.8 [156.4]	337.0 [171.0]	44.00 [1117]		2097 [951.2]



(SANCTUARY)

# #38 AH 024 - PL11 SYSTEM CONDENSING UNIT

## ESTIMATED SOUND POWER LEVELS

38AKS013-044

ESTIMATED RADIATED SOUND POWER LEVEL, dB

(SANCTUARY)

UNIT MODEL	OCTAVE BAND CENTER FREQUENCY, Hz								dBA
	63	125	250	500	1000	2000	4000	8000	
38AKS013	NA	93	86	83	80	78	73	71	86.2
38AKS014	NA	93	86	83	80	78	73	71	86.2
38AKS016	NA	93	86	83	80	78	73	71	86.2
38AKS024	83.5	81.5	88.5	86.5	85.5	82.5	76.5	61.5	90
38AKS028	95	95	93	90	89	84	82	81	83.5
38AKS034	96	96	94	91	90	85	83	83	94.6
38AKS044	99	99	96	93	92	88	86	86	96.9

38AH024-034

ESTIMATED RADIATED SOUND POWER LEVEL, dB

UNIT MODEL	OCTAVE BAND CENTER FREQUENCY, Hz								dBA
	63	125	250	500	1000	2000	4000	8000	
38AH024	95	95	93	90	89	84	82	81	93.5
<del>38AH028</del>	<del>95</del>	<del>95</del>	<del>93</del>	<del>90</del>	<del>89</del>	<del>84</del>	<del>82</del>	<del>81</del>	<del>93.5</del>
38AH034	96	96	94	91	90	85	83	83	94.6

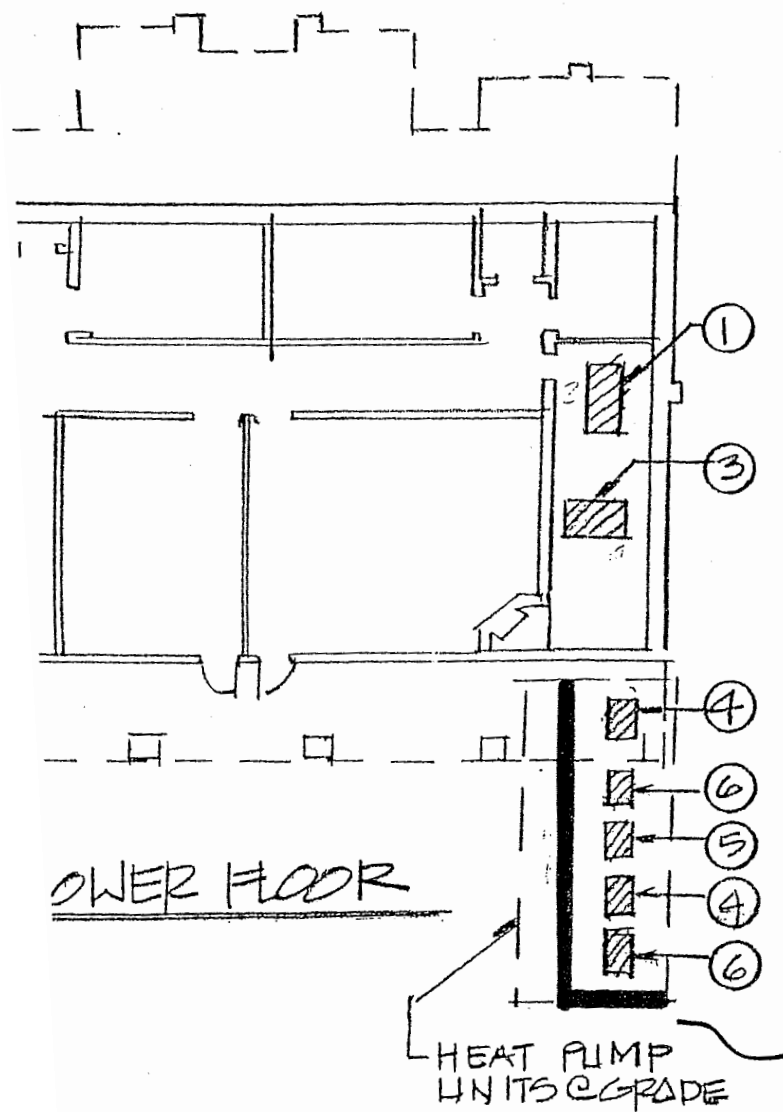
Estimated sound power levels, dB re 1 Picowatt

This data is based upon a limited amount of actual testing with the estimated sound power data being generated from this data in accordance with ARI Standard 370 for large outdoor refrigerating and air conditioning equipment.

Since this data is estimated, the sound power levels should not be guaranteed or certified as being the actual sound power levels. The acoustic center of the unit is located at the geometric center of the unit.

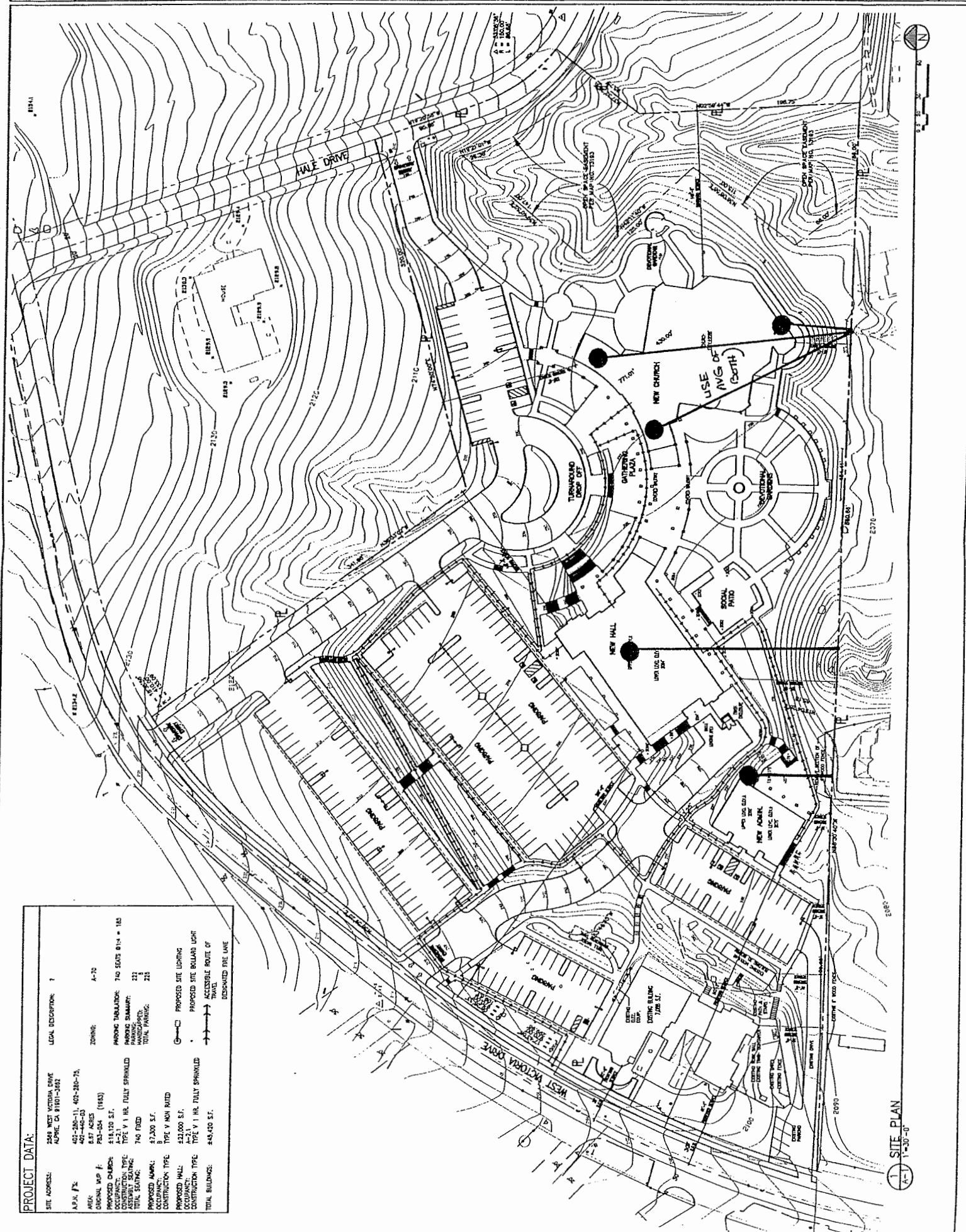
## WORKSHEET

	A	B	C	D	E	F	G	H	I	J
ADMIN.	2087'	N/A	2079'	80'	0'	N/A	N/A	N/A	N/A	0dB
HALL	2108'	2108'	2063'	57'	131'	193.31'	57.00' +138.51'	2.20'	2.16	16dB
ROOF	2128	2128	2077	67	137	210.28'	67.00' +146.18'	2.90'	2.84	18dB
W/WALL	2087	2090	2079	5'	75'	80.40'	5.83' +75.80'	1.23'	1.21	13dB
	<p>A = Source Height (msl) - see attached</p> <p>B = Barrier Height (msl) - " "</p> <p>C = Receiver Height (ground + 5dB)</p> <p>D = Source to Barrier Distance</p> <p>E = Barrier to Receiver Distance</p> <p>F = Direct Path Length</p> <p>G = Indirect Path Length</p> <p>H = Path Length Difference (<math>\delta</math>)</p> <p>I = Fresnel No. (<math>3.21 \times \delta \div 3.28</math>)</p> <p>J = Noise Level Reduction</p>									



MASONRY WALL

6-FOOT ABOVE GRADE TO TOP



**WA-SERIES      Refrigerant 22      60Hz**  
**1.5 to 5 Ton (18,300 to 57,500 Btuh)**  
**Right Side Control Panel**

The Bard Wall-Mount Air Conditioner is a self contained energy efficient system which is designed to offer maximum indoor comfort at a minimal cost without using valuable indoor floor space or outside ground space. This unit is the ideal product for versatile applications such as: new construction, modular offices, school modernization, telecommunication structures, portable structures or correctional facilities. Factory or field installed accessories are available to meet specific job requirements.



## Engineered Features

**Aluminum Finned Copper Coils:**  
Grooved tubing and enhanced louvered fin for maximum heat transfer and energy efficiency.

**Twin Blowers:**  
Move air quietly. Most models feature multispeed blower motors providing airflow adjustment for high and low static operation. Motor overload protection is standard on all models.

**Air Conditioner Compressor:**  
Reciprocating compressors are designed for high compression ratios. Equipped with crankcase heater and dual discharge muffler. Standard on 1.5 and 2 ton models.

Scroll Compressors are designed for increased efficiency, quieter operation and improved reliability for longer life. Eliminates need for crankcase heater. Standard on 2.5 to 5 ton, and available on 2 ton models.

**Phase Rotation Monitor:**  
Standard on all 3 phase scroll compressors. Protects against reverse rotation if power supply is not properly connected. Not required on reciprocating compressors.

**Galvanized 20 Gauge Zinc Coated Steel Cabinet:**  
Cleaned, rinsed, sealed and dried before the polyurethane primer is applied. The cabinet is handsomely finished with a baked on textured enamel which allows it to withstand 1000 hours of salt spray exposure.

**Electrical Components:**  
Are easily accessible for routine inspection and maintenance through a right side, service panel opening. Features a lockable, hinged access cover to the circuit breaker or pull disconnect switch.

**Electric Heat Strips:**  
Features an automatic limit and thermal cut-off safety control. Heater packages can be factory or field installed for all 1.5 through 5 ton models.

**One Inch, Disposable Air Filters:**  
Are standard equipment. Optional one inch washable filters available and filter racks permit the addition of 2" pleated filter. Factory or field installed.

**Condenser Fan and Motor Shroud Assembly:**  
Slides out for easy access.

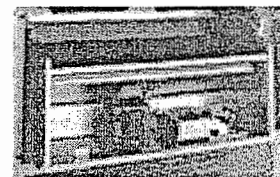
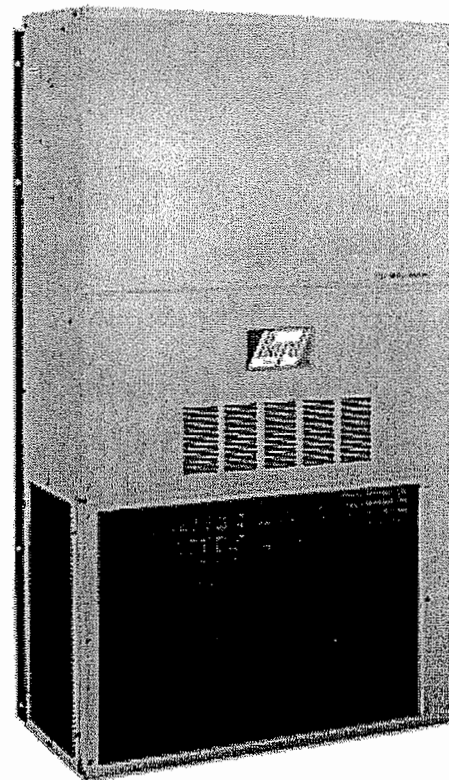
**Barometric Fresh Air Damper:**  
Standard on all units. Allows up to 25% outside fresh air.

**Built-in Circuit Breakers:**  
Standard on all electric heat versions of single (230/208 volt) and three phase (230/208 volt) equipment. Toggle disconnects are standard on all electric heat versions of three phase (460 volt) equipment.

**Slope Top:**  
Standard feature for water run-off.

**Full Length Mounting Brackets:**  
Built into cabinet for improved appearance and easy installation. NOTE: Bottom mounting bracket included to assist in installation.

**Top Rain Flashing:**  
Standard feature on all models.



Economizer

Unit shown with optional Economizer.

## Ventilation System Packages

All packages are designed to meet your specific ventilation requirements utilizing one of five ventilation options for the product. The ventilation package is mounted within the unit eliminating the need for an exterior mounted hood or damper assembly on the unit. All assemblies can be factory installed, installed in the field at time of installation or as a retrofit system after installation.

- Standard - Barometric Fresh Air Damper
- Optional - Motorized Fresh Air Damper
- Optional - Blank off Plate
- Optional - Commercial Room Ventilator (CRV)
- Optional - Economizer
- Optional - Energy Recovery Ventilator

## Capacity and Efficiency Ratings <sup>①</sup>

MODELS	WA182	WA242	WA253	WA302	WA372	WA423	WA484	WA602
Cooling Capacity BTUH	18,300	24,000	23,000	30,000	36,000	42,000	47,500	57,500
SEER	10.20	10.50	11.00	10.60	10.00	10.60	11.00	10.20

① Certified in accordance with ARI Standard 210/240-94.

All capacity, efficiency and cost of operation information is based on high speed operation with fresh air cover plate. Cover plate must be ordered separately and is recommended for use to obtain maximum energy efficiency where fresh air is not required.

## Specifications 1-1/2 Ton through 3 Ton

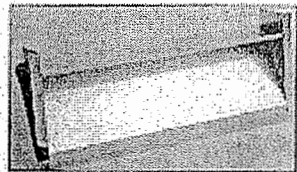
MODELS	WA182-A	WA242-A	WA242-B	WA253-A	WA253-B	WA302-A	WA302-B	WA302-C	WA372-A	WA372-B	WA372-C
Cooling Capacity	18,300	24,000	24,000	23,000	23,000	30,000	30,000	30,000	36,000	36,000	36,000
Heating Capacity	See Electric Heat Table										
Electrical Rating—60 Hz	230/208-1	230/208-1	230/208-3	230/208-1	230/208-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197-253	197-253	197-253	197-253	197-253	197-253	197-253	414-506	197-253	197-253	414-506
Compressor—Circuit A											
Voltage	230/208	230/208	230/208	230/208	230/208	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	7.0/8.0	9.5/10.0	6.6/6.9	8.6/9.5	6.5/7.0	12.2/12.9	8.4/8.4	4.2	16.5/17.3	10.5/11.0	5.2
Branch Circuit Selection Current	9.0	10.0	7.0	10.3	7.1	14.1	9.0	4.5	17.3	11.0	5.5
Lock Rotor Amps	49/49	56/56	51/51	54/54	45/45	73/73	63/63	31	100/100	77/77	37
Compressor Type	Recip.	Recip.	Recip.	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser											
Fan Motor—HP—RPM	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075	1/5 - 1075
Fan Motor—Amps	1.2	1.2	1.2	1.2	1.2	1.5	1.5	1.4	1.5	1.5	1.4
Fan—DIA/CFM	18" - 1600	18" - 1600	18" - 1600	18" - 1600	18" - 1600	20" - 2100	20" - 2100	20" - 2100	20" - 1900	20" - 1900	20" - 1900
Blower Motor & Evap.											
Blower Motor—HP—RPM—SPD	1/6-1100-1	1/6-1100-1	1/6-1100-1	1/6-1100-1	1/6-1100-1	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2	1/3-1100-2
Blower Motor—Amps	1.0	1.0	1.0	1.0	1.0	2.2	2.2	1.1	2.2	2.2	1.1
CFM Cooling & E.S.P. w/Filter (Rated-Wet Coil)	650 - .40	800 - .20	800 - .20	800 - .20	800 - .20	1000 - .40	1000 - .40	1000 - .40	1100 - .30	1100 - .30	1100 - .30
Filter Sizes (inches) STD.	16x25x1	16x25x1	16x25x1	16x25x1	16x25x1	16x30x1	16x30x1	16x30x1	16x30x1	16x30x1	16x30x1
Shipping Weight —LBS.	300	300	300	300	300	355	355	355	355	355	355

## Specifications 3-1/2 Ton through 5 Ton

MODELS	WA423-A	WA423-B	WA423-C	WA484-A	WA484-B	WA484-C	WA602-A	WA602-B	WA602-C
Cooling Capacity	42,000	42,000	42,000	47,500	47,500	47,500	57,500	57,500	57,500
Heating Capacity	See Electric Heat Table								
Electrical Rating—60 Hz	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3	230/208-1	230/208-3	460-3
Operating Voltage Range	197-253	197-253	414-506	197-253	197-253	414-506	197-253	197-253	414-506
Compressor—Circuit A									
Voltage	230/208	230/208	460	230/208	230/208	460	230/208	230/208	460
Rated Load Amps	19.3/21	11.8/11.8	6.1	20.2/20.8	11.9/12.3	6.2	26.0/28.5	18.1/18.4	6.8
Branch Circuit Selection Current	21	12.5	6.5	21.8	12.9	6.5	29.0	19.0	9.0
Lock Rotor Amps	127/127	88/88	42	131/131	91/91	46	148/148	137/137	62
Compressor Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Fan Motor & Condenser									
Fan Motor—HP—RPM—SPD	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2	1/3-850-2
Fan Motor—Amps	2.5	2.5	1.3	2.5	2.5	1.3	2.5	2.5	1.3
Fan—DIA/CFM	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600	24" - 2600
Blower Motor & Evap.									
Blower Motor—HP—RPM—SPD	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2	1/2-1070-2
Blower Motor—Amps	3.3	3.3	1.9	3.3	3.3	1.9	3.3	3.3	1.9
CFM Cooling & E.S.P. w/Filter (Rated-Wet Coil)	1400 - .30	1400 - .30	1400 - .30	1550 - .20	1550 - .20	1550 - .20	1700 - .30	1700 - .30	1700 - .30
Filter Sizes (inches) STD.	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1	20x30x1
Shipping Weight —LBS.	500	500	500	500	500	500	500	500	500

## Ventilation System Packages

Bard Wall-Mounts are designed to provide optional ventilation packages to meet all of your ventilation and indoor air quality requirements. All units are equipped with a barometric fresh air damper as the standard ventilation package. All ventilation packages can be built-in at the factory, or field-installed at a later date.



Barometric Fresh Air Damper

### BAROMETRIC FRESH AIR DAMPER - BFAD

### STANDARD

The barometric fresh air damper is a standard feature on all models. It is installed on the inside of the service door and allows outside ventilation air, up to 25% of the total airflow rating of the unit, to be introduced through the air inlet openings and to be mixed with the conditioned air. The damper opens during blower operation and closes when the blower is off. Adjustable blade stops allow different amounts of outside air to be introduced into the building and can be easily locked closed if required.



Motorized Fresh Air Damper

### BLANK OFF PLATE - BOP

### OPTIONAL

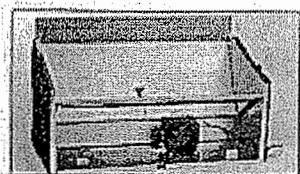
A blank off plate is installed on the inside of the service door. It covers the air inlet openings which restricts any outside air from entering the unit. The blank off plate should be utilized in applications where outside air is not required to be mixed with the conditioned air.

### MOTORIZED FRESH AIR DAMPER - MFAD

### OPTIONAL

The motorized fresh air damper is internally mounted behind the service door and allows outside ventilation air, up to 25% of the total airflow rating of the unit, to be introduced through the air inlet openings and to be mixed with the conditioned air. The two position damper can be fully open or closed. The damper blade is powered open by a 24VAC motor with spring return on power loss. The damper can be controlled by indoor blower operation or can be field connected to be managed based on building occupancy.

**NOTE:** The above vent systems are without exhaust capability. May require separate field installed barometric relief and/or mechanical exhaust elsewhere within the conditioned space.



Commercial Room Ventilator

### COMMERCIAL ROOM VENTILATOR - CRV

### OPTIONAL

The built-in commercial room ventilator is internally mounted behind the service door and allows outside ventilation air, up to 50% of the total airflow rating of the unit, to be introduced through the air inlet openings. It includes a built-in exhaust air damper.

The commercial room ventilator (CRV) is a simple and innovative approach to improving the indoor air quality by providing fresh air intake and exhaust capability through the CRV. The damper can be easily adjusted to control the amount of fresh air supplied into the building. The CRV can be controlled by indoor blower operation or field controlled based on room occupancy. The CRV is power open - spring return on power loss. Complies with ASHRAE Standard 62-01 "Ventilation for Acceptable Indoor Air Quality."



Economizer

### ECONOMIZER - EIFM

### OPTIONAL

The built-in economizer system is internally mounted behind the service door and allows outdoor air to be introduced through the air inlet openings. The amount of outdoor air varies in response to the system controls and settings defined by the end user. It includes a built-in exhaust air damper. The economizer is designed to provide "free cooling" when outside air conditions are cool and dry enough to satisfy cooling requirements without running the compressor. This in turn provides lower operating costs, while extending the life of the compressor.

### Standard Features:

- One Piece Construction - Easy to install with no mechanical linkage adjustment required.
- Exhaust Air Damper - Built in with positive closed position. Provides exhaust air capability to prevent pressurization of tight buildings.
- Actuator Motor - 24 volt, power open, spring return with built in torque limiting switch.
- Proportioning Type Control - for maximum "free cooling" economy and comfort.
- Moisture Eliminator & Prefilter - permanent, washable aluminum construction.
- Enthalpy Control - adjustable to monitor outdoor temperature and humidity.
- Minimum Position Potentiometer - adjustable to control minimum damper blade position for ventilation purposes.
- Mixed Air Sensor - to monitor outside and return air to automatically modulate damper position.



Energy Recovery Ventilator

### WALL-MOUNT ENERGY RECOVERY VENTILATOR - WERV

### OPTIONAL

The wall-mount energy recovery ventilator (WERV) is a highly innovative approach to meeting indoor air quality ventilation requirements as established by ASHRAE Standard 62-01. The WERV allows from 200 to 450 CFM (depending upon model) of fresh air and exhaust through the unit while maintaining superior indoor comfort and humidity levels. In most cases this can be accomplished without increasing equipment sizing or operating costs. Heat transfer efficiency is up to 67% during summer and 75% during winter conditions.

The WERV consists of a unique "rotary energy recovery cassette" that provides effective sensible and latent heat transfer capabilities during summer and winter conditions. Various control schemes are addressed including limiting ventilation during building occupancy only.

The WERV is designed to be internally mounted behind the service door in the WA, WH or WL model wall-mount units. It can be built-in at the factory or field installed as an option. (See Form F1403 for complete performance and application details.

Manufactured under U.S. Patent Nos. 5,485,878; 5,301,744;  
5,002,116; 4,924,934; 4,875,520; 4,825,936; 4,432,409.

## Commercial Room Ventilator Performance Data - CRV-2

		0.00 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	120	145	175	210	245	275	305
	B	175	195	220	250	280	309	335
	C	225	245	260	290	320	340	360
	D	285	300	310	325	345	360	380
	E	345	355	360	365	370	385	400
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.10 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	110	145	175	210	240	275	310
	B	165	185	215	245	270	300	330
	C	210	230	250	280	305	330	350
	D	265	280	290	310	330	345	365
	E	320	330	335	345	355	365	380
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.20 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	103	140	177	206	234		
	B	150	179	209	235	262		
	C	197	219	240	265	290		
	D	247	260	273	293	313		
	E	296	301	305	320	335		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.30 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	95	135	175				
	B	135	165	200				
	C	175	200	220				
	D	221	235	250				
	E	268	275	280				
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.40 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	87						
	B	120						
	C	152						
	D	196						
	E	239						
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

### NON-DUCTED BLOW APPLICATION VENTILATION AIR WITH RETURN AIR FILTER GRILLE AND SUPPLY AIR GRILLE

		Ventilation Air (CFM)						
Damper Position	A		175					
	B		215					
	C		255					
	D		300					
	E		345					

### CRV-2 TOTAL DELIVERED AIR

		Total Delivered Air (CFM)					
Damper Close Position		1006	946	886	789	691	
A		1001	943	884	785	685	
B		990	931	873	775	677	
C		978	920	862	765	668	
D		945	888	832	738	645	
E		912	857	801	711	621	
Return Static Pressure		.00	.10	.20	.30	.40	

## Commercial Room Ventilator Performance Data - CRV-3

		0.10 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	130	150	180	225	275	320	365
	B	220	240	265	300	340	375	410
	C	310	325	350	375	400	425	450
	D	390	405	420	440	450	470	485
	E	470	480	485	495	505	515	520
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.20 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	115	140	180	225	280	325	365
	B	205	230	255	295	335	370	405
	C	290	310	335	360	385	410	440
	D	365	385	400	415	425	445	470
	E	435	445	450	460	465	480	490
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.30 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	110	140	180	235	290		
	B	185	215	250	290	330		
	C	260	285	315	340	405		
	D	330	350	370	385	400		
	E	400	410	415	430	435		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.40 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	100	140	180				
	B	160	200	240				
	C	225	260	295				
	D	295	315	340				
	E	365	370	380				
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.00 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	100	135	175	225	275		
	B	165	205	245	285	325		
	C	240	275	310	345	375		
	D	315	345	375	400	415		
	E	400	420	440	450	455		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.10 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	100	135	180	225	280		
	B	160	200	240	280	325		
	C	230	265	300	335	370		
	D	310	335	360	385	405		
	E	395	410	425	430	435		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

		0.20 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	100	140	190	240	295		
	B	160	200	245	290	330		
	C	220	260	300	330	360		
	D	290	320	350	370	390		
	E	365	380	394	405	420		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

### NON-DUCTED BLOW APPLICATION VENTILATION AIR WITH RETURN AIR FILTER GRILLE AND SUPPLY AIR GRILLE

		Ventilation Air (CFM)	
		High Speed	Low Speed
Damper Position	A	180	175
	B	265	245
	C	360	305
	D	430	370
	E	495	450

### CRV-3 TOTAL DELIVERED AIR

		Total Delivered Air (CFM)					
High Speed Blower		1370	1300	1230	1133	1035	935
Damper Close Position	A	1360	1293	1225	1124	1022	920
	B	1355	1289	1223	1123	1016	913
	C	1350	1285	1220	1120	1010	905
	D	1325	1258	1190	1190	980	875
	E	1300	1230	1160	1160	950	845
Return Static Pressure		.00	.10	.20	.30	.40	.50

### CRV-3 TOTAL DELIVERED AIR

		Total Delivered Air (CFM)					
Low Speed Blower		1027	1009	990	930	869	
Damper Close Position	A	1016	998	979	918	856	
	B	994	984	972	907	841	
	C	972	969	966	896	825	
	D	962	945	928	856	783	
	E	951	921	890	816	741	
Return Static Pressure		.00	.05	.10	.15	.20	

# Commercial Room Ventilator Performance Data - CRV-5

High Speed Blower		0.00 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	185	270	350	390	425	490	550
	B	345	425	460	500	540	595	650
	C	500	535	570	615	660	710	755
	D	660	685	715	740	770	805	840
	E	820	835	855	870	885	910	930
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

High Speed Blower		0.20 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	175	260	350	390	430	490	550
	B	325	385	450	495	540	590	645
	C	480	515	550	600	650	695	740
	D	630	660	690	720	750	785	820
	E	780	805	830	840	850	875	900
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

High Speed Blower		0.30 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	185	255	330	380	430		
	B	320	375	435	485	535		
	C	460	500	540	590	640		
	D	600	625	655	690	730		
	E	745	755	770	795	820		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

High Speed Blower		0.40 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	195	255	315				
	B	320	365	420				
	C	440	480	525				
	D	575	595	650				
	E	710	710	715				
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

Low Speed Blower		0.00 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	200	260	320	380	440		
	B	295	345	395	460	525		
	C	390	430	470	540	610		
	D	520	550	585	630	680		
	E	650	675	700	725	750		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

Low Speed Blower		0.10 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	185	250	310	375	435		
	B	280	335	385	450	515		
	C	380	425	465	530	595		
	D	505	540	570	620	665		
	E	635	660	680	710	740		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

Low Speed Blower		0.20 SUPPLY AIR STATIC						
		Ventilation Air (CFM)						
Damper Position	A	180	240	300	365	430		
	B	275	325	380	445	510		
	C	370	415	465	530	595		
	D	490	525	560	610	655		
	E	615	635	660	690	720		
Return Static Pressure		.00	.05	.10	.15	.20	.25	.30

NON-DUCTED BLOW APPLICATION VENTILATION AIR WITH RETURN AIR FILTER GRILLE AND SUPPLY AIR GRILLE		
Ventilation Air (CFM)		
		High Speed
Damper Position	A	350
	B	460
	C	575
	D	720
	E	870
		Low Speed
Damper Position	A	315
	B	390
	C	465
	D	575
	E	690

CRV-5 TOTAL DELIVERED AIR WA / WL / WH 42 and 48						
High Speed Blower		Total Delivered Air (CFM)				
Damper Close Position	A	1865	1775	1685	1585	1485
	B	1860	1770	1685	1585	1485
	C	1850	1755	1660	1560	1460
	D	1840	1740	1655	1555	1455
	E	1770	1680	1590	1490	1390
Return Static Pressure		.00	.10	.20	.30	.40

CRV-5 TOTAL DELIVERED AIR WA / WL / WH 42 and 48						
Low Speed Blower		Total Delivered Air (CFM)				
Damper Close Position	A	1560	1530	1500	1460	1425
	B	1545	1515	1480	1445	1415
	C	1530	1495	1460	1430	1400
	D	1510	1485	1455	1420	1385
	E	1480	1450	1420	1385	1345
Return Static Pressure		.00	.10	.20	.30	.40

CRV-5 TOTAL DELIVERED AIR WA / WL / WH 60						
High Speed Blower		Total Delivered Air (CFM)				
Damper Close Position	A	2040	1955	1870	1775	1680
	B	2030	1950	1870	1775	1680
	C	1995	1910	1830	1740	1645
	D	1960	1875	1790	1700	1610
	E	1885	1750	1615	1575	1535
Return Static Pressure		.00	.10	.20	.30	.40

CRV-5 TOTAL DELIVERED AIR WA / WL / WH 60						
Low Speed Blower		Total Delivered Air (CFM)				
Damper Close Position	A	1510	1480	1450	1420	1385
	B	1490	1460	1430	1400	1370
	C	1465	1435	1410	1380	1350
	D	1440	1415	1390	1360	1330
	E	1405	1375	1350	1320	1290
Return Static Pressure		.00	.10	.20	.30	.40

# Performance and Application Data- WERV-2B

Ambient O.D. DB/ WB		SUMMER COOLING PERFORMANCE (INDOOR DESIGN CONDITIONS 75°F DB/62°F WB)															
		VENTILATION RATE - 250 CFM 62% EFFICIENCY								VENTILATION RATE - 225 CFM 63% EFFICIENCY							
		VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT	HRS	HRL	VLT	VLS	VLL	HRT
75	11925	8100	1325	7394	5022	822	10727	7287	344	6758	4591	2168	9540	6480	3080	6010	4082
105	70	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082
65	8100	8100	0	5022	5022	0	7287	7287	0	4591	4591	0	6480	6480	0	4082	4082
80	17550	6750	10800	1088	4185	5696	15788	6072	9716	9946	3826	6121	14040	5400	8640	8845	3402
75	11925	6750	5175	7394	4185	3209	10727	6072	4655	6758	3826	2933	9540	5400	4140	6010	3402
100	70	6750	113	4255	4185	70	6173	6072	101	3889	3826	64	5490	5400	90	3458	3402
65	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402
60	6750	6750	0	4185	4185	0	6072	6072	0	3826	3826	0	5400	5400	0	3402	3402
80	17550	5400	12150	1088	3348	7533	15788	4858	10930	9946	3060	6886	14040	4320	9720	8845	2722
75	11925	5400	6525	7394	3348	4046	10727	4858	5870	6758	3060	3698	9540	4320	5220	6010	2722
95	70	5400	1463	4255	3348	907	6173	4858	1315	3889	3060	829	5490	4320	1170	3458	2722
65	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722
60	5400	5400	0	3348	3348	0	4858	4858	0	3060	3060	0	4320	4320	0	2722	2722
80	17550	4050	13500	1088	2511	8370	15788	3643	12145	9946	2295	7651	14040	3240	10800	8845	2041
75	11925	4050	7875	7394	2511	4883	10727	3643	7084	6758	2295	4463	9540	3240	6300	6010	2041
90	70	4050	2813	4255	2511	1744	6173	3643	2530	3889	2295	1594	5490	3240	2250	3458	2041
65	4050	4050	0	2511	2511	0	3643	3643	0	2295	2295	0	3240	3240	0	2041	2041
60	4050	4050	0	2511	2511	0	3643	3643	0	2295	2295	0	3240	3240	0	2041	2041
80	17550	2700	14850	1088	1674	9207	15788	2429	13359	9946	1530	8416	14040	2160	11880	8845	1361
75	11925	2700	9225	7394	1674	5720	10727	2429	8296	6758	1530	5228	9540	2160	7380	6010	1361
85	70	2700	4163	4255	1674	2581	6173	2429	3744	3889	1530	2359	5490	2160	3300	3458	1361
65	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361
60	2700	2700	0	1674	1674	0	2429	2429	0	1530	1530	0	2160	2160	0	1361	1361
75	11925	1350	10575	7394	837	5557	10727	1214	9513	6758	765	5993	9540	1080	8480	6010	680
80	6863	1350	5513	4255	837	3418	6173	1214	4959	3889	765	3124	5490	1080	4410	3458	680
65	2363	1350	1013	1465	837	628	2125	1214	911	1339	765	547	1890	1080	810	1190	680
60	1350	1350	0	837	837	0	1214	1214	0	765	765	0	1080	1080	0	680	680
70	6863	0	6863	4255	0	4255	6173	0	6173	6889	0	3889	5490	0	5490	3458	0
75	65	2363	0	2363	1465	0	1465	2125	0	2125	1339	0	1339	1890	0	1890	1190
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LEGEND:

VLT = Ventilation Load - Total  
VLS = Ventilation Load - Sensible  
VLL = Ventilation Load - Latent  
HRT = Heat Recovery - Total  
HRS = Heat Recovery - Sensible  
HRL = Heat Recovery - Latent  
WVL = Winter Ventilation Load  
WHR = Winter Heat Recovery

## WERV-2B WINTER HEATING PERFORMANCE (INDOOR DESIGN CONDITIONS 70°F DB)

Ambient O.D. DB/F		VENTILATION RATE							
		250 CFM 74% EFF.				225 CFM 75% EFF.			
		WVL	WHR	WVL	WHR	WVL	WHR	WVL	WHR
65	1350	999	1214	911	1080	810	810	810	810
60	2700	1998	2429	1822	2160	1620	1620	1620	1620
55	4050	2997	3643	2733	3240	2430	2430	2430	2430
50	5400	3996	4858	3643	4320	3240	3240	3240	3240
45	6750	4995	6072	4554	5400	4050	4050	4050	4050
40	8100	5994	7287	5465	6480	4860	4860	4860	4860
35	9450	6993	8501	6376	7560	5670	5670	5670	5670
30	10800	7992	9716	7287	8640	6480	6480	6480	6480
25	12150	8991	10930	8198	9720	7290	7290	7290	7290
20	13500	9990	12145	9108	10800	8100	8100	8100	8100
15	14850	10989	13359	10019	11880	8910	8910	8910	8910

NOTE: Sensible performance only is shown for winter application.

## Performance and Application Data- WERV-\*5B

Ambient O.D.		SUMMER COOLING PERFORMANCE (INDOOR DESIGN CONDITIONS 75°DB562°WB)																		
		VENTILATION RATE 450 CFM						VENTILATION RATE 375 CFM						VENTILATION RATE 300 CFM						
DB/ WB	F	VL	VS	VLL	HRT	HRS	HRL	VL	VS	VLL	HRT	HRS	HRL	VL	VS	VLL	HRT	HRS	HRL	
105	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
100	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
95	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
90	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
85	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
80	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
75	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
70	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
65	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
60	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
55	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
50	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
45	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
40	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
35	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
30	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
25	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
20	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
15	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
10	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
5	75	21465	14580	6884	13952	9477	4475	17887	12150	5737	11805	8018	3786	14310	9720	4590	9587	6512	3075	
		105	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
		65	14580	14580	0	9477	9477	0	12150	12150	0	8018	8018	0	9720	9720	0	6512	6512	0
0	80	31590	12150	19440	20533	7897	12635	26325	10125	16200	17374	66682	10692	21060	8100	12960	14110	5427	8683	
		75	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0
		65	12150	12150	0	7897	7897	0	10125	10125	0	16200	16200	0	12960	12960	0	5427	5427	0

**WERV-5B WINTER HEATING PERFORMANCE**  
(INDOOR DESIGN CONDITIONS 70°F DB)

(INDOOR DESIGN CONDITIONS 70°F DB)									
Ambient O.D.	VENTILATION RATE								
	450 CFM			375 CFM			300 CFM		
	WVL	WHR	DB°F	WVL	WHR	DB°F	WVL	WHR	DB°F
65	2430	1944	2430	1944	2025	1640	1620	1328	1620
60	4860	3888	4050	3240	2656	3985	3168	2528	2656
55	7290	5832	6075	4920	4860	3985	3168	2528	3985
50	9720	7776	8100	6561	6480	5313	4296	3432	5313
45	12150	9720	10125	8201	8100	6642	5376	4300	6642
40	14580	11664	12150	9841	9720	7970	6144	4968	7970
35	17010	13608	14175	11481	11340	9298	7056	5664	9298
30	19440	15552	16200	13122	12960	10627	7968	6432	10627
25	21870	17496	18225	14762	14580	11955	8880	7200	11955
20	24300	19440	20250	16402	16200	13284	9792	7920	13284
15	26730	21384	22275	18042	17920	14612	10704	8688	14612

**NOTE:** Sensible performance only is shown for winter application.

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# Electrical Specifications

Model	Rated Volts and Phase	No. Field Power Circuits	Single Circuit				Dual Circuit							
			Ø Minimum Circuit Ampacity	Ø Maximum External Fuse or Ckt. Brkr.	Ø Field Power Wire Size	Ø Ground Wire	Ø Minimum Circuit Ampacity		Ø Maximum External Fuse or Ckt. Brkr.		Ø Field Power Wire Size		Ø Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
WA182 - A00, A0Z	230/208-1	1	16	20	12	12								
A05		1	30	30	10	10								
A08		1	45	45	8	10								
A10		1	56	60	6	10								
WA242 - A00, A0Z	230/208-1	1	17	20	12	12								
A05		1	30	30	10	10								
A08		1	45	45	8	10								
A10		1	56	60	6	10								
WA242 - B00, B0Z	230/208-3	1	13	15	14	12								
B06		1	22	25	10	10								
WA253 - A00, A0Z	230/208-1	1	18	25	10	10								
A05		1	30	30	10	10								
A08		1	45	45	8	10								
A10		1	56	60	6	10								
WA253 - B00, B0Z	230/208-3	1	14	20	12	12								
B06		1	22	25	10	10								
WA302 - A00*, A0Z*	230/208-1	1	24	35	8	10								
A05*		1	31	35	8	10								
A08		1	47	50	8	10								
A10*		1	57	60	6	10								
A15		1 or 2	83	90	4	8	57	26	60	30	6	10	10	10
WA302 - B00*, B0Z*	230/208-3	1	17	20	12	12								
B06		1	23	25	10	10								
B09*		1	32	35	8	10								
B15		1	50	50	8	10								
WA302 - C00*, C0Z*	460-3	1	10	15	14	14								
C06		1	12	15	14	14								
C09*		1	17	20	12	12								
C15		1	26	30	10	10								
WA372 - A00*, A0Z*	230/208-1	1	28	35	8	10								
A05*		1	32	35	8	10								
A08		1	47	50	8	10								
A10*		1	58	60	6	10								
A15		1 or 2	84	90	4	8	57	26	60	30	6	10	10	10
WA372 - B00*, B0Z*	230/208-3	1	20	25	10	10								
B06		1	24	25	10	10								
B09*		1	33	35	8	10								
B15		1	51	60	6	10								
WA372 - C00*, C0Z*	460-3	1	11	15	14	14								
C06		1	12	15	14	14								
C09*		1	17	20	10	10								
C15		1	26	30	10	10								
WA423 - A00, A0Z	230/208-1	1	35	50	8	10								
A05		1	35	50	8	10								
A10		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	110	110	2	6	59	52	60	60	6	6	10	10
WA423 - B00, B0Z	230/208-3	1	24	35	8	10								
B09		1	34	35	8	10								
B15		1	52	60	6	10								
B18		1	60	60	6	10								
WA423 - C00, C0Z	460-3	1	13	15	14	14								
C09		1	17	20	12	12								
C15		1	26	30	10	10								
WA484 - A00, A0Z	230/208-1	1	36	50	8	10								
A05		1	36	50	8	10								
A10		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	110	110	2	6	59	52	60	60	6	6	10	10
WA484 - B00, B0Z	230/208-3	1	25	35	8	10								
B09		1	34	35	8	10								
B15		1	52	60	6	10								
B18		1	60	60	6	10								
WA484 - C00, C0Z	460-3	1	13	15	14	14								
C09		1	17	20	12	12								
C15		1	26	30	10	10								
WA602 - A00, A0Z	230/208-1	1	44	60	8	10								
A05		1	44	60	8	10								
A10		1	59	60	6	10								
A15		1 or 2	85	90	4	8	59	26	60	30	6	10	10	10
A20		1 or 2	110	110	2	6	59	52	60	60	6	6	10	10
WA602 - B00, B0Z	230/208-3	1	32	45	8	10								
B09		1	34	45	8	10								
B15		1	52	60	6	10								
B18		1	60	60	6	10								
WA602 - C00, C0Z	460-3	1	16	20	12	12								
C09		1	17	20	12	12								
C15		1	26	30	10	10								

① Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

② Based on 75C copper wire. All wiring must conform to the National Electrical Code and all local codes.

③ These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing.

**Caution:** When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

\* Top outlet supply option is available only factory installed and only on the selected models.

**IMPORTANT:** While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.

## Indoor Blower Performance - CFM at 230 or 460 Volts

ESP in H <sub>2</sub> O	WA182 WA242 WA253	WA302 WA372		WA423 WA484		WA602	
	Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil	High Speed Dry/Wet Coil	Low Speed Dry/Wet Coil
0	1020/975	1395/1315	950/935	1885/1800	1650/1600	2200/2000	1600/1450
.1	960/905	1340/1270	930/915	1770/1665	1550/1500	2100/1900	1525/1375
.2	865/800	1285/1190	910/885	1635/1550	1450/1400	2000/1800	1465/1200
.3	820/735	1205/1100	855/830	1500/1400	1350/1300	1875/1700	-/-
.4	735/650	1110/1000	800/755	1370/1285	1300/1175	1775/1600	-/-
.5	615/535	1005/870	-/-	1250/1150	-/-	1650/1475	-/-

Above data is with 1" standard throwaway filter and 1" washable filter.

For optional 2" pleated filter - reduce ESP by .15 in.

See installation instructions for maximum ESP information on various KW application.

## Electric Heat Table

Model	WA182-A WA242-A WA253-A		WA242-B WA253-B		WA302-A WA372-A		WA302-B WA372-B		WA302-C WA372-C	WA423-A WA484-A WA602-A		WA423-B WA484-B WA602-B		WA423-C WA484-C WA602-C
KW	240V-1 BTUH	208V-1 BTUH	240V-3 BTUH	208V-3 BTUH	240V-1 BTUH	208V-1 BTUH	240V-3 BTUH	208V-3 BTUH	460V-3 BTUH	240V-1 BTUH	208V-1 BTUH	240V-3 BTUH	208V-3 BTUH	460V-3 BTUH
5.0	18,000	14,000			18,000	14,000				18,840	14,300			
8.0	28,000	21,000			28,000	21,000								
10.0	34,000	26,000			35,000	26,000				35,900	27,100			
15.0					52,000	39,000				52,975	39,900			
20.0										70,035	52,700			
6.0			21,000	16,000			22,000	16,000	22,000					
9.0							32,000	24,000	29,500			32,395	24,530	32,475
15.0							52,000	39,000	48,000			52,975	40,175	52,975
18.0												63,210	47,575	

## Heater Packages - Field Installed

- Designed for adding Electric Heat to 0 KW Units
- Circuit Breaker Standard on 230/208V Models
- Toggle Disconnect Standard on 460V Models

- UL Listed
- CUL Listed

Air Conditioner Models	-A00 Models 230/208-1		-B00 Models 230/208-3		-C00 Models 460-3	
	Heater Model #	KW	Heater Model #	KW	Heater Model #	KW
WA182	EHWA02-A05 EHWA02A-A08 EHWA02A-A10	5 8 10	N/A		N/A	
WA242 WA253	EHWA02-A05 EHWA02A-A08 EHWA02A-A10	5 8 10	EHWA24-B06	6	N/A	
WA302 WA372	EHWA03-A05 EHWA03-A08 EHWA03-A10 EHWA03-A15	5 8 10 15	EHWA03-B06 EHWA03-B09 EHWA03-B15	6 9 15	EHWC03A-C06 EHWC03A-C09 EHWA03A-C15	6 9 15
WA423 WA484	EHWA05-A05 EHWA05-A10 EHWA05-A15 EHWA05-A20	5 10 15 20	EHWA05-B09 EHWA05-B15 EHWA05-B18	9 15 18	EHWA05A-C09 EHWA05A-C15	9 15
WA602	EHWA60-A05 EHWA05-A10 EHWA05-A15 EHWA05-A20	5 10 15 20	EHWA60-B09 EHWA05-B15 EHWA05-B18	9 15 18	EHWA05A-C09 EHWA05A-C15	9 15

NOTE: Field installed Heater Packages are not approved for use with top supply opening models.

# Cooling Application Data - Outdoor Temperature ①

Model	D.B./W.B. ②	Cooling Capacity	75°F	80°F	85°F	90°F	95°F	100°F	105°F	110°F	115°F	120°F	125°F
WA182	75/ 62	Total Cooling	19,600	18,675	17,725	16,825	15,925	15,050	14,175	13,325	12,500	11,700	11,100
		Sensible Cooling	14,825	14,700	14,475	14,190	13,830	13,390	12,880	12,300	11,640	10,700	10,150
	80/ 67	Total Cooling	20,975	20,360	19,710	19,020	18,300	17,540	16,750	15,920	15,060	14,400	13,800
		Sensible Cooling	14,625	14,465	14,300	14,135	13,970	13,640	13,230	12,720	12,125	11,600	11,000
	85/ 72	Total Cooling	24,950	23,780	22,620	21,460	20,315	19,180	18,050	16,930	15,815	14,700	13,600
		Sensible Cooling	14,750	14,620	14,400	14,090	13,690	13,190	12,610	11,930	11,155	10,400	9,650
WA242	75/ 62	Total Cooling	24,900	23,880	22,870	21,670	20,880	19,900	18,920	17,960	17,000	16,050	15,050
		Sensible Cooling	19,900	19,530	19,140	18,720	18,275	17,800	17,300	16,770	16,215	15,300	14,300
	80/ 67	Total Cooling	26,600	26,040	25,420	24,740	24,000	23,210	22,350	21,450	20,480	19,000	17,550
		Sensible Cooling	19,300	19,160	18,970	18,740	18,460	18,140	17,770	17,350	16,890	15,700	14,400
	85/ 72	Total Cooling	31,300	30,350	29,260	28,020	26,640	25,110	23,440	21,620	20,600	19,475	18,400
		Sensible Cooling	19,775	19,430	19,040	18,590	18,090	17,530	16,920	16,260	15,540	14,700	13,900
WA253	75/ 62	Total Cooling	23,400	22,600	21,800	21,000	20,100	19,200	18,300	17,400	16,400	15,400	14,300
		Sensible Cooling	19,100	18,700	18,400	17,900	17,600	17,100	16,600	16,200	15,600	15,100	14,600
	80/ 67	Total Cooling	24,900	24,600	24,200	23,700	23,000	22,300	21,500	20,700	19,700	18,600	17,400
		Sensible Cooling	18,500	18,300	18,200	17,900	17,700	17,400	17,000	16,700	16,200	15,800	15,300
	85/ 72	Total Cooling	29,700	28,800	27,800	26,800	25,600	24,400	23,200	22,100	20,700	19,400	17,900
		Sensible Cooling	19,000	18,600	18,300	17,800	17,400	16,900	16,200	15,700	15,000	14,300	13,600
WA302	75/ 62	Total Cooling	30,900	29,700	28,500	27,400	26,100	25,100	24,000	22,900	21,900	20,800	19,700
		Sensible Cooling	25,700	25,300	24,900	24,400	23,900	23,300	22,700	22,200	21,500	20,800	20,100
	80/ 67	Total Cooling	33,000	32,300	31,600	30,900	30,000	29,200	28,300	27,300	26,300	25,200	24,000
		Sensible Cooling	24,900	24,800	24,600	24,400	24,100	23,700	23,300	22,900	22,300	21,700	21,100
	85/ 72	Total Cooling	39,300	37,800	36,300	34,900	33,400	32,000	30,500	29,100	27,700	26,200	24,700
		Sensible Cooling	25,500	25,200	24,700	24,300	23,700	23,000	22,200	21,500	20,600	19,600	18,700
WA372	75/ 62	Total Cooling	37,300	35,700	34,200	32,800	31,400	30,100	28,900	27,800	26,700	25,700	24,600
		Sensible Cooling	28,100	27,700	27,300	26,800	26,400	25,800	25,200	24,500	23,800	22,900	22,100
	80/ 67	Total Cooling	39,800	38,900	38,000	37,000	36,000	35,100	34,100	33,100	32,100	31,100	30,000
		Sensible Cooling	27,200	27,100	27,000	26,800	26,600	26,200	25,800	25,300	24,700	24,000	23,200
	85/ 72	Total Cooling	47,400	45,500	43,700	41,800	40,000	38,400	36,800	35,200	33,800	32,300	30,900
		Sensible Cooling	27,900	27,500	27,200	26,600	26,100	25,400	24,600	23,700	22,800	21,700	20,600
WA423	75/ 62	Total Cooling	43,200	41,700	40,100	38,400	36,600	34,800	33,000	31,000	29,000	26,900	24,700
		Sensible Cooling	35,000	34,300	33,500	32,800	32,000	31,200	30,200	29,300	28,300	27,200	26,100
	80/ 67	Total Cooling	46,100	45,400	44,500	43,400	42,000	40,500	38,900	37,000	34,900	32,600	30,100
		Sensible Cooling	33,900	33,600	33,200	32,800	32,300	31,700	31,000	30,300	29,400	28,500	27,500
	85/ 72	Total Cooling	54,900	53,100	51,100	49,000	46,700	44,300	42,000	39,400	36,700	33,900	31,000
		Sensible Cooling	34,700	34,100	33,400	32,600	31,700	30,700	29,600	28,400	27,100	25,800	24,400
WA484	75/ 62	Total Cooling	48,200	46,300	44,650	43,070	41,300	39,340	37,190	34,840	32,300	30,900	29,500
		Sensible Cooling	39,120	38,520	37,680	37,510	37,000	36,130	34,910	33,330	31,400	30,000	28,700
	80/ 67	Total Cooling	51,440	50,440	49,640	48,750	47,500	45,890	43,920	41,590	38,900	38,100	37,250
		Sensible Cooling	37,950	37,800	37,600	37,400	37,300	36,740	35,800	34,490	32,800	32,050	31,350
	85/ 72	Total Cooling	59,900	58,650	57,240	55,350	52,700	49,700	46,700	43,800	40,850	39,100	37,450
		Sensible Cooling	38,750	38,250	37,450	37,230	36,600	35,570	34,150	32,320	30,100	28,700	27,500
WA602	75/ 62	Total Cooling	60,350	57,500	54,630	52,320	50,000	47,660	45,290	42,910	40,500	N/A	N/A
		Sensible Cooling	45,170	43,700	42,180	41,110	40,000	38,840	37,640	36,390	35,100	N/A	N/A
	80/ 67	Total Cooling	64,600	62,750	60,690	59,190	57,500	55,610	53,540	51,260	48,800	N/A	N/A
		Sensible Cooling	43,950	42,960	41,830	41,150	40,400	39,570	38,660	37,670	36,600	N/A	N/A
	85/ 72	Total Cooling	76,800	73,300	69,610	66,740	63,800	60,780	57,700	54,530	51,300	N/A	N/A
		Sensible Cooling	44,900	43,470	41,970	40,840	39,600	38,260	36,810	35,260	33,600	N/A	N/A

① Below 65°F (18.3°C), unit requires a factory or field installed low ambient control.  
 ② Return air temperature.

Capacity Multiplier Factors			
% of Rated Airflow	-10	Rated	+10
Total BTUH	0.975	1.0	1.02
Sensible BTUH	0.950	1.0	1.05

**MODEL NUMBER** | WA 37 2 - A 10 X

**CAPACITY** |  
 18 - 1-1/2 Ton  
 24 - 2 Ton  
 25 - 2 Ton  
 30 - 2-1/2 Ton  
 37 - 3 Ton  
 42 - 3-1/2 Ton  
 48 - 4 Ton  
 60 - 5 Ton

**REVISION** |

**KW** |

**VENTILATION OPTIONS**  
 X - Barometric Fresh Air Damper (Standard)  
 B - Blank-off Plate  
 M - Motorized Fresh Air Damper  
 V - Commercial Room Ventilator-Motorized with Exhaust  
 E - Economizer - Fully Modulating with Exhaust  
 R - Energy Recover Ventilator - Motorized with Exhaust  
 D - Economizer - Fully Modulating with Exhaust  
 (For use only with "V" Control Module and TCS20 DDC Controller)

**COLOR OPTIONS**  
 X - Beige (Standard)  
 1 - White  
 2 - Mesa Tan  
 4 - Buckeye Gray  
 5 - Desert Brown  
 8 - Dark Bronze

**CONTROL MODULES**  
 (See Chart Below)

**COIL OPTIONS**  
 X - Standard  
 1 - Phenolic Coated Evaporator  
 2 - Phenolic Coated Condenser  
 3 - Phenolic Coated Evaporator and Condenser

**OUTLET OPTIONS**  
 X - Front (Standard)  
 T - Top (on WA30 and WA37 Models)

**FILTER OPTIONS**  
 X - 1 inch Throwaway (Standard)  
 W - 1 inch Washable  
 P - 2 inch Pleated

**VOLTS & PHASE** |  
 A - 230/208/60/1  
 B - 230/208/60/3  
 C - 460/60/3

Note: For 0KW and circuit breakers (230/208 Volt) or toggle disconnects (460 Volt) applications, insert OZ in the KW field of the model number.

## Ventilation Options

Models	WA182, WA242, WA253		WA302, WA372		WA423, WA484, WA602	
Description	Factory Installed Code No.	Field Installed Part No.	Factory Installed Code No.	Field Installed Part No.	Factory Installed Code No.	Field Installed Part No.
Barometric Fresh Air Damper	X	BFAD-2	X	BFAD-3	X	BFAD-5
Blank-Off Plate	B	BOP-2	B	BOP-3	B	BOP-5
Motorized Fresh Air Damper	M	MFAD-2	M	MFAD-3	M	MFAD-5
Commercial Ventilator - Motorized	V	CRV-2	V	CRV-3	V	CRV-5
Economizer - Fully Modulating Ⓚ	E	E1FM-2B	E	E1FM-3B	E	E1FM-5B
Economizer - Fully Modulating ⓀⓀ	D	N/A	D	N/A	D	N/A
Energy Recovery Ventilator - 230 Volt	R	WERV-A2B	R	WERV-A3B	R	WERV-A5B
Energy Recovery Ventilator - 460 Volt	N/A	N/A	R	WERV-C3B	R	WERV-C5B

① Low ambient control is required with economizer for low temperature compressor operation.

② For use only with "V" Control Module and TCS20 Controller.

## Air Conditioning Control Modules

AVAILABLE CONTROL OPTIONS									Models	
TDR ①	HPC ②	LPC ③	CCM ④	LAC ⑤	ALR ⑥	SK ⑦	ODT ⑧	DDC ⑨	Factory Installed Code	Field Installed Part
●				●					D	CMA-5
	●								E	CMA-6
	●	●	●						G	CMA-10A
	●	●	●	●					H	CMA-13A
●				●					I	CMA-12
	●	●	●	●	●				J	Factory Only
	●	●	●	●		●			K	CMA-13A & CMC-15
	●	●	●	●	●	●			M	Factory Only
						●			Field Installed Only	CMC-15
							●		Field Installed Only	CMA-14
	●	●	●	●	●			●	V ⑩	Factory Only
								●	Field Installed Only	CMA-23

## Air Conditioning Control Modules

AVAILABLE CONTROL OPTIONS									VALVE, VALVE, VALVE MODELS	
TDR Ⓞ	HPC Ⓞ	LPC Ⓞ	CCM Ⓞ	LAC Ⓞ	ALR Ⓞ	SK Ⓞ	ODT Ⓞ	DDC Ⓞ	Factory Installed Code	Field Installed Part
Does Not Apply To These Models	STD	●	STD						G	CMA-16A
	STD	●	STD	●					H	CMA-18A
	STD		STD	●					I	CMA-6
	STD	●	STD	●	●				J	Factory Only
	STD	●	STD	●		●			K	CMA-13A & CMC-15
	STD	●	STD	●	●	●			M	Factory Only
	STD		STD			●			Field Installed Only	CMC-15
	STD		STD				●		Field Installed Only	CMA-14
	STD	●	STD	●	●			●	V Ⓞ	Factory Only
STD		STD					●	Field Installed Only	CMA-24 ▲	

STD = Standard equipment for these specified models.

① TDR. Time delay relay only for compressor is fixed 5-minute delay-on-break to prevent short cycling. Not needed if HPC or LPC are used. See notes ②, ③, and ④.

② HPC. High pressure control is auto reset. Always used with compressor control module (CCM) which is included. See note ④.

③ | PC: Low pressure control is auto reset. Always used with compressor control module (CCM) which is included. See note ④

④ CCM. Compressor control module has adjustable 30-second to 5-minute delay-on-break timer. On initial power-up, or any time the power is interrupted, the delay-on-make will be 2-minutes plus 10% of the delay-on-break setting. There is no delay-on-make during routine operation of the unit. The module also provides the lockout feature (with 1 retry) for high and/or low-pressure controls, and a 2-minute timed bypass for low-pressure control.

⑤ LAC. Low ambient control permits cooling operation down to 0°F

⑥ ALB. The alarm relay has a set of normally open and normally closed dry contacts to provide the ability to signal a condition of shutdown on either high or low pressure controls.

⑦ SK. Start kit can be used with all -A single phase models only. Is not used or available for -B or -C three phase models.

⑧ OPT. Outdoor thermostat is adjustable from 0 to 50°F. It is suitable for use as a compressor cut-off thermostat.

⑨ DDC. Incorporates 4 additional sensors: discharge air temperature, indoor blower airflow, compressor current, and dirty filter. These sensing devices function to input analog data such as temperature, as well as digital data such as air flow, compressor status or filter status.

① "V" control module should be ordered in conjunction with direct digital controller (DDC) model TCS20. Refer to DDC specification sheet S3280 for more information.

■ Use CMA-24 for Model WA423. ▲ Use CMA-23 for Models WA253.

## Clearances Required for Service Access and Adequate Condenser Air Flow

MODELS	LEFT SIDE	RIGHT SIDE
WA18, WA24, WA25, WA37	15"	20"
WA42, WA48, WA60	20"	20"

NOTE: For side by side installation of two (2) WA models there must be 20" between units. This can be reduced to 15" by using a WL model (left side compressor and controls) for the left unit and WA (right side compressor and controls) for right unit. See WL Specifications S3279.

## Minimum Clearances Required to Combustible Materials

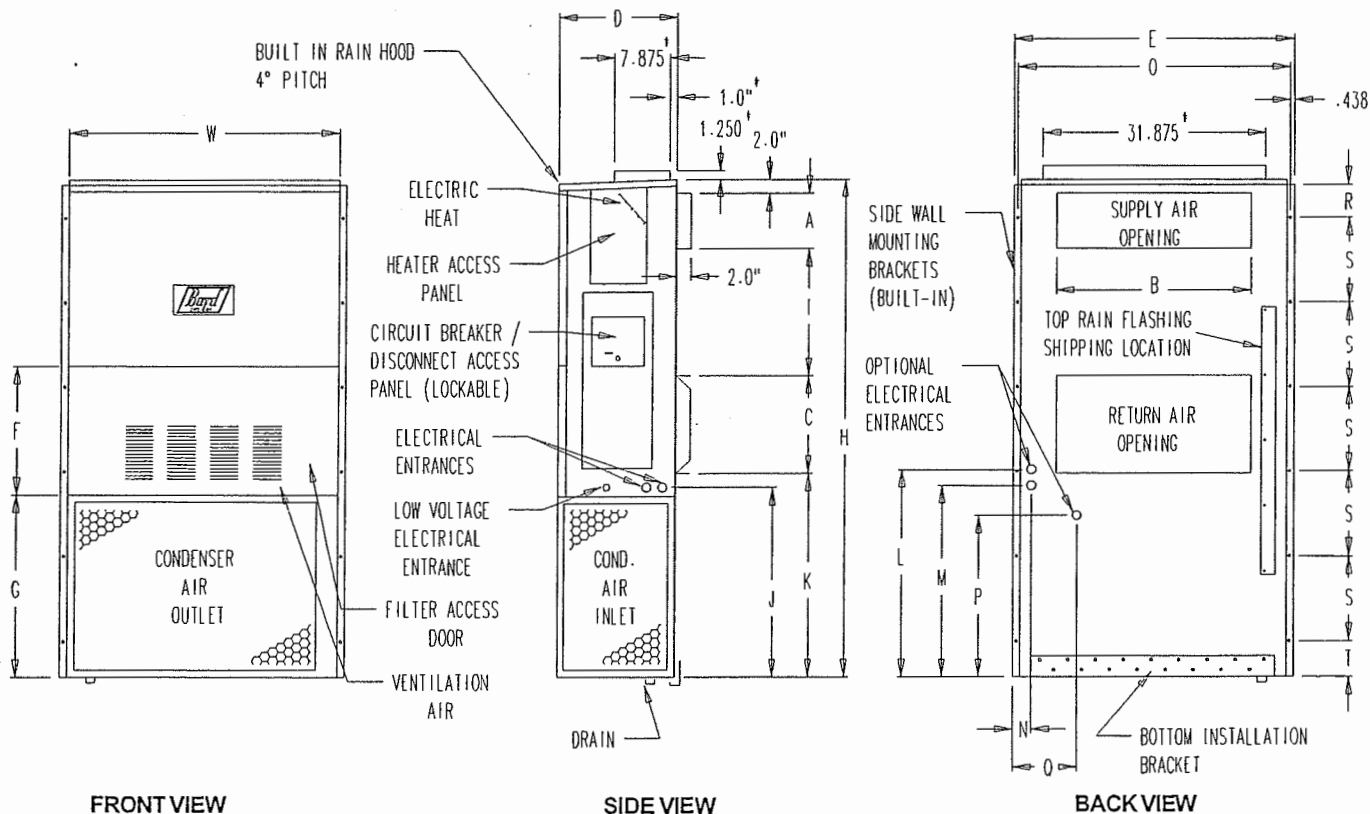
MODELS ①	SUPPLY AIR DUCT FIRST THREE FEET	CABINET
WA18, WA24, WA25	0"	0"
WA30, WA37	1/4"	0"
WA42, WA48, WA60	1/4"	0"

① Refer to the installation manual for more detailed information.

## Dimensions of Basic Unit for Architectural and Installation Requirements (Nominal)

MODEL	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN																
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	P	Q	R	S	T
WA18 WA24 WA25	33.300	17.125	70.563	7.88	19.88	11.88	19.88	35.00	18.50	25.75	20.56	26.75	28.06	29.25	27.00	2.63	34.13	22.06	10.55	4.19	12.00	5.00
WA30 WA37	38.200	17.125	70.563	7.88	27.88	13.88	27.88	40.00	18.50	25.75	17.93	26.75	28.75	29.25	27.00	2.75	39.19	22.75	9.14	4.19	12.00	5.00
WA42 WA48 WA60	42.075	22.432	84.875	9.88	29.88	15.88	29.88	43.88	19.10	31.66	30.00	32.68	26.94	34.69	32.43	3.37	42.88	23.88	10.00	2.00	16.00	1.88

All dimensions are in inches. Dimensional drawings are not to scale.



\*Optional top outlet (factory installed only) for WA30 and WA37 models only.

MIS-1262



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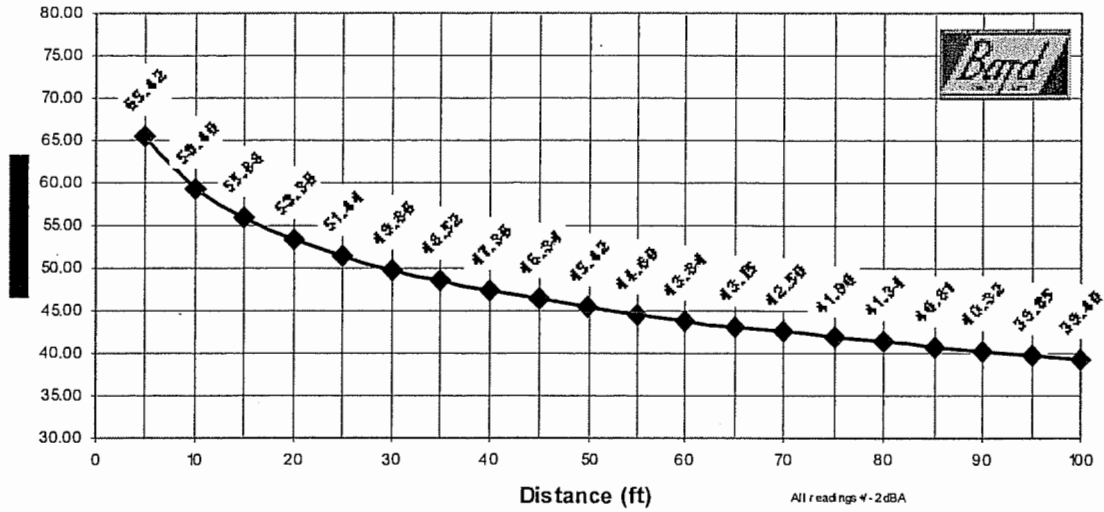
Due to our continuous product improvement policy, all specifications subject to change without notice.

Before purchasing this appliance, read important energy cost and efficiency information available from your retailer.

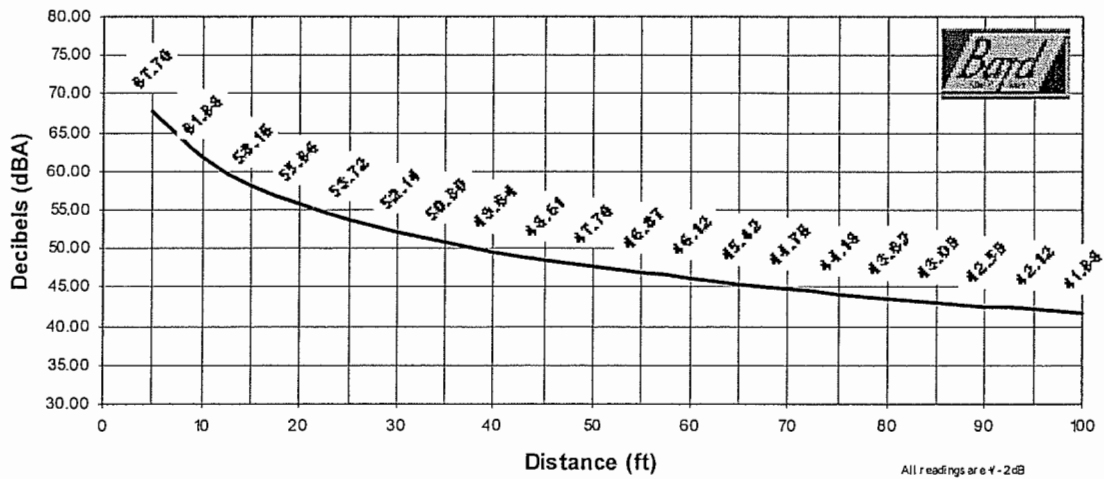
Form No.  
S3208  
March, 2002

Supersedes S3208-301

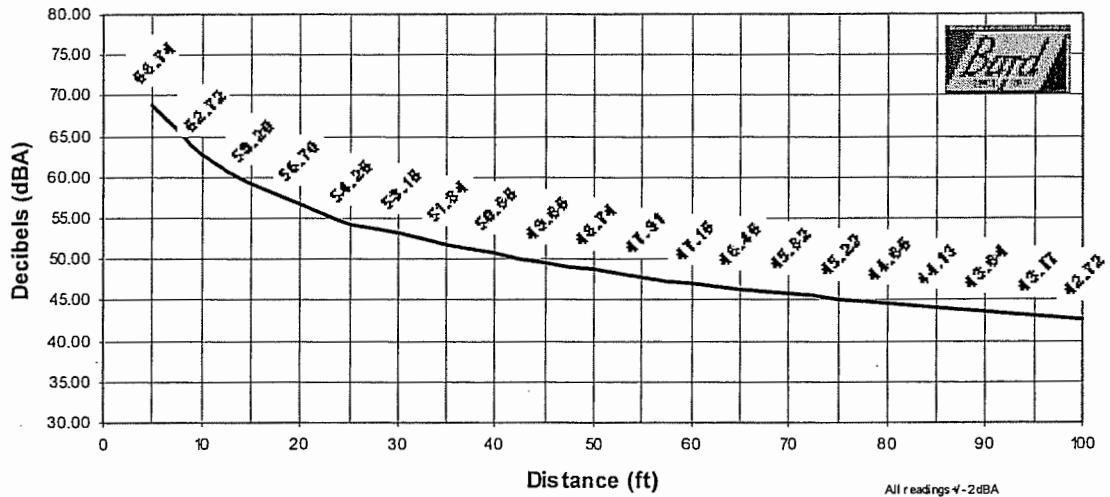
WHWA181 & WHWA241 Outdoor Sound Pressure



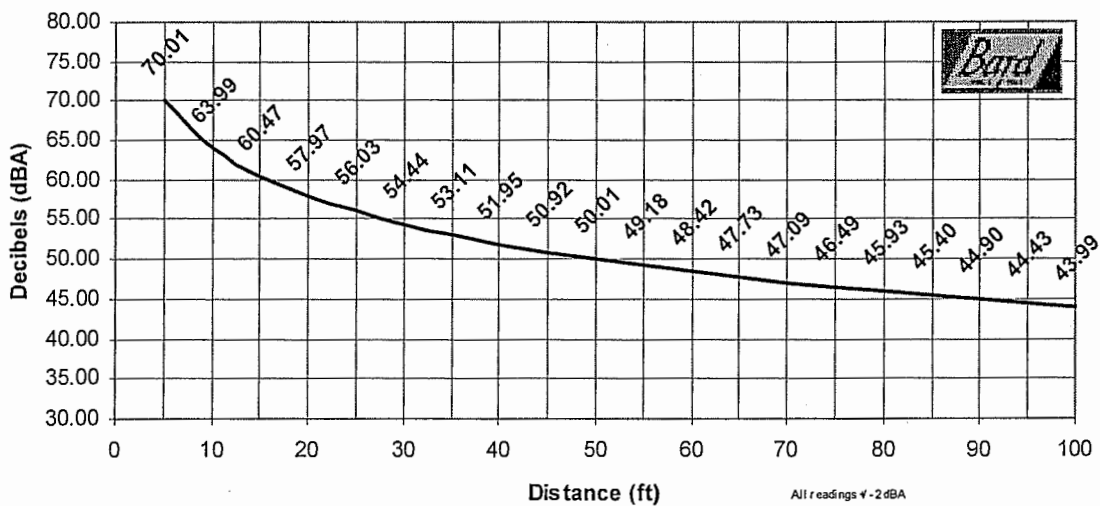
WHWA301 & WHWA361 Outdoor Sound Pressure



WH/WA421 Outdoor Sound Pressure



WH/WA482 & WH/WA602 & WA701 Outdoor Sound Pressure



### Source-Receiver Noise Analysis Matrix:

Receiver/Location	Rec. Elev. (feet)	Distance to:					
		Sanctuary			Hall		Admin.
		East (feet)	West (feet)	Ground (feet)	Roof (feet)	Subroof (feet)	Ground (feet)
403-441-03 (South House)							
Patio	2069	240(x)	270(x)	100	390	330	440
P.L.	2075	190(x)	240(x)	60	240	280	280
403-441-04 (Southwest House)							
Patio	2075	350	450(x)	370	220	280	90
P.L.	2080	340	430(x)	350	200	250	70
402-440-02 (East House)							
Patio	2091	320	380(x)	340(x)	>500(x)	>500(x)	>500(x)
P.L.	2075	210	280(x)	270(x)	>500(x)	400(x)	>500(x)
402-280-79 (North House)							
Patio	2135	300	360	480(x)	420	370	>500(x)
P.L.	2114	140	210	330(x)	250	320	440(x)

(x)=Line-of-sight intercepted by sanctuary roof.

**Site Geometrics Detail:**

**SOUTH HOUSE PATIO**

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	Roof Intercept				240
2	Roof Intercept				270
3	2090	2069	2088 (slope)	50	100
4	2112	2069	2119 (well)	20	390
5	2097	2069	2100 (para.)	10	330
6	2078	2069	N/A	N/A	440

**SOUTH HOUSE P.L.**

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	Roof Intercept				190
2	Roof Intercept				240
3	2090	2075	2088 (slope)	50	60
4	2112	2075	2119 (well)	20	340
5	2097	2075	2100 (para.)	10	280
6	2078	2075	N/A	N/A	380

## SOUTHWEST HOUSE PATIO

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2075	2104 (para.)	20	350
2	Roof Intercept				450
3	2090	2075	2088 (slope)	160	370
4	2112	2075	2119 (well)	30	220
5	2097	2075	2100 (para.)	10	280
6	2078	2075	N/A	N/A	90

## SOUTHWEST HOUSE P.L.

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2080	2104	20	350
2	Roof Intercept				430
3	2090	2080	2088 (slope)	160	350
4	2112	2080	2119 (well)	30	200
5	2097	2080	2100 (para.)	10	250
6	2078	2080	N/A	N/A	70

## EAST HOUSE PATIO

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2091	2104	10	320
2	Roof Intercept				380
3	Roof Intercept				340
4	Roof Intercept				>500
5	Roof Intercept				>500
6	Roof Intercept				>500

## EAST HOUSE P.L.

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2075	2104	10	210
2	Roof Intercept				280
3	Roof Intercept				270
4	Roof Intercept				>500
5	Roof Intercept				400
6	Roof Intercept				>500

## NORTH HOUSE PATIO

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2135	2104 (para.)	10	300
2	2101	2135	2104 (para.)	10	360
3	Roof Intercept				480
4	2112	2135	2119 (well)	30	420
5	2097	2135	2100 (para.)	10	370
6	Roof Intercept				>500

## NORTH HOUSE P.L.

Source No.	Source Elev. (feet)	Rec. Elev. (feet)	Barrier Height (feet)	Source to Barrier (feet)	Source to Receiver (feet)
1	2101	2114	2104 (para.)	10	140
2	2101	2114	2104 (para.)	10	210
3	Roof Intercept				330
4	2112	2114	2119 (well)	20	250
5	2097	2114	2100 (para.)	10	320
6	Roof Intercept				440

**Path Length Differences/Noise Level Reduction:**

**SOUTH HOUSE PATIO**

<b>Source No.</b>	<b>Direct Path (feet)</b>	<b>Indirect Path 1 (feet)</b>	<b>Indirect Path 2 (feet)</b>	<b>Fresnel No.</b>	<b>NLR (dB)</b>
3	102.18	50.04	54.23	2.04	16+3
4	392.36	21.19	373.26	2.15	16
5	331.19	10.44	321.50	0.73	12
6	N/A	N/A	N/A	N/A	0

**SOUTH HOUSE P.L.**

<b>Source No.</b>	<b>Direct Path (feet)</b>	<b>Indirect Path 1 (feet)</b>	<b>Indirect Path 2 (feet)</b>	<b>Fresnel No.</b>	<b>NLR (dB)</b>
3	61.85	50.04	16.40	4.49	19+3
4	342.01	21.19	323.01	2.14	16
5	280.86	10.44	271.15	0.72	12
6	N/A	N/A	N/A	N/A	0

## **SOUTHWEST HOUSE PATIO**

<b>Source No.</b>	<b>Direct Path (feet)</b>	<b>Indirect Path 1 (feet)</b>	<b>Indirect Path 2 (feet)</b>	<b>Fresnel No.</b>	<b>NLR (dB)</b>
1	350.96	20.22	331.27	0.52	11
3	370.30	160.01	210.40	0.11	7+3
4	252.72	30.81	224.36	2.39	17
5	280.86	10.44	271.15	0.72	12
6	N/A	N/A	N/A	N/A	0

## **SOUTHWEST HOUSE P.L.**

<b>Source No.</b>	<b>Direct Path (feet)</b>	<b>Indirect Path 1 (feet)</b>	<b>Indirect Path 2 (feet)</b>	<b>Fresnel No.</b>	<b>NLR (dB)</b>
1	340.65	20.22	320.90	0.46	10
3	390.13	160.01	210.15	0.03	6+3
4	202.54	30.81	174.42	2.63	17
5	250.58	10.44	240.83	0.68	12
6	N/A	N/A	N/A	N/A	0

**EAST HOUSE PATIO**

Source No.	Direct Path (feet)	Indirect Path 1 (feet)	Indirect Path 2 (feet)	Fresnel No.	NLR (dB)
1	320.16	10.44	310.27	0.54	11

**EAST HOUSE P.L.**

Source No.	Direct Path (feet)	Indirect Path 1 (feet)	Indirect Path 2 (feet)	Fresnel No.	NLR (dB)
1	211.60	10.44	202.09	0.91	13

**NORTH HOUSE PATIO**

Source No.	Direct Path (feet)	Indirect Path 1 (feet)	Indirect Path 2 (feet)	Fresnel No.	NLR (dB)
1	301.92	10.44	291.65	0.17	7
2	361.60	10.44	351.37	0.21	8
4	420.63	30.81	390.33	0.50	10
5	371.95	10.44	361.70	0.18	8

**NORTH HOUSE P.L.**

Source No.	Direct Path (feet)	Indirect Path 1 (feet)	Indirect Path 2 (feet)	Fresnel No.	NLR (dB)
1	140.60	10.44	130.38	0.22	8
2	210.40	10.44	200.25	0.28	9
4	250.01	21.19	230.05	1.20	13
5	320.45	10.44	310.32	0.30	9

# Noise Exposure Analysis (dBA Leq):

## **SOUTH HOUSE PATIO**

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	46	15*	34
2	95	47	15*	33
3	68	38	19	11
4	89	50	16	23
5	76	48	12	16
6	80	51	0	29
<b>TOTAL</b>				<b>37</b>

\*Assume 15 dB for sanctuary roof intercept.

## **SOUTH HOUSE P.L.**

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	44	15*	36
2	95	46	15*	34
3	68	34	22	12
4	89	49	16	24
5	76	47	12	17
6	80	50	0	30
<b>TOTAL</b>				<b>39</b>

\*Assume 15 dB for sanctuary roof intercept.

## SOUTHWEST HOUSE PATIO

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	49	11	35
2	95	51	15*	29
3	68	49	10	9
4	89	45	17	27
5	76	47	12	17
6	80	37	0	43
<b>TOTAL</b>				<b>44</b>

\*Assume 15 dB for sanctuary roof intercept.

## SOUTHWEST HOUSE P.L.

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	49	10	36
2	95	51	15*	29
3	68	49	9	10
4	89	44	17	28
5	76	46	12	18
6	80	35	0	45
<b>TOTAL</b>				<b>46</b>

\*Assume 15 dB for sanctuary roof intercept.

## EAST HOUSE PATIO

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	48	11	36
2	95	50	15*	30
3	68	49	15*	4
4	89	52	15*	22
5	76	52	15*	9
6	80	52	15*	13
<b>TOTAL</b>				<b>37</b>

\*Assume 15 dB for sanctuary roof intercept.

## EAST HOUSE P.L.

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	44	13	38
2	95	47	15	33
3	68	47	15*	6
4	89	52	15*	22
5	76	50	15*	11
6	80	52	15*	13
<b>TOTAL</b>				<b>39</b>

\*Assume 15 dB for sanctuary roof intercept.

## NORTH HOUSE PATIO

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	48	7	40
2	95	49	8	38
3	68	52	15*	1
4	89	50	10	29
5	76	49	8	19
6	80	52	15*	13
<b>TOTAL</b>				<b>42</b>

\*Assume 15 dB for sanctuary roof intercept.

## NORTH HOUSE P.L.

Source No.	Ref. LVL	Distance Reduction	Barrier Reduction	Residual Level
1	95	41	8	46
2	95	44	9	42
3	68	48	15*	5
4	89	46	13	30
5	76	48	9	19
6	80	51	15*	14
<b>TOTAL</b>				<b>48</b>

\*Assume 15 dB for sanctuary roof intercept.

### Source – Receiver Distances

Source	A	B	C	D
Reference Level (dB)	(53)	(51)	(51)	(53)
Patio North	440	330	530	610
P/L North	215 <sup>a</sup>	200 <sup>b</sup>	310	375
Patio East	640	500	620	725
P/L East	530	400	520	620
Patio SW	460	350	380	480
P/L SW	370	260	310	400
Patio South	250	290	150	100
P/L South	220	270	125	75

Source:

A=Interim Fellowship Hall

B=North Portables

C=South Portables

D=Interim Administration Building

Shaded Values are structurally shielded.

<sup>a</sup>At point of clear line-of-sight

<sup>b</sup>At point of cumulative impact with Source A.